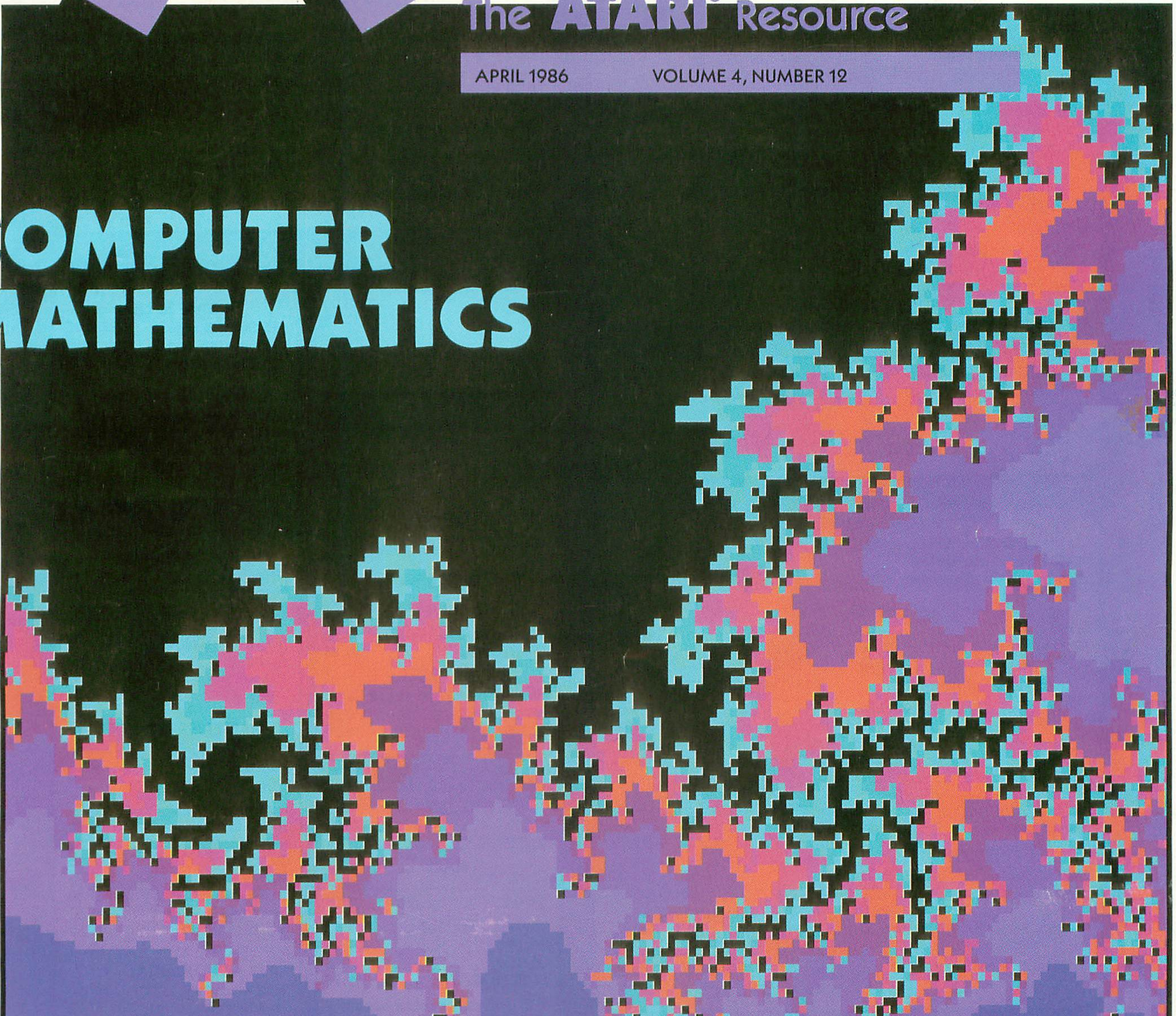
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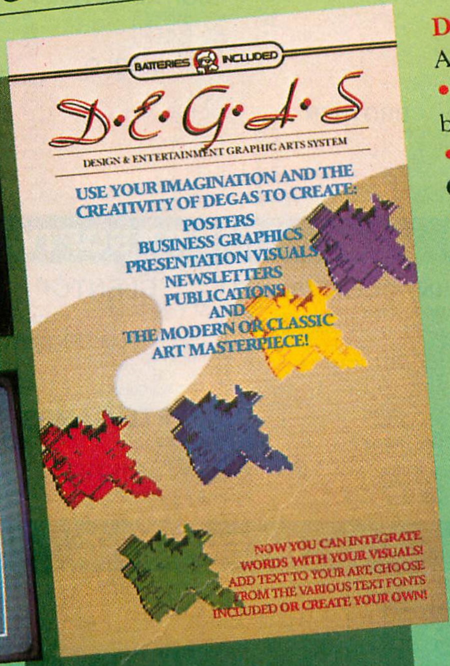
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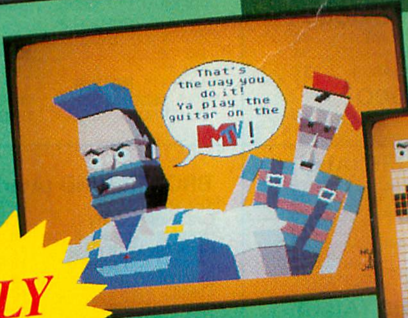
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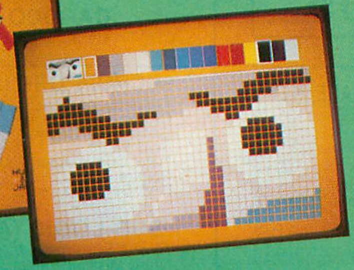
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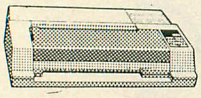
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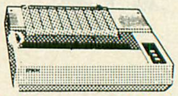
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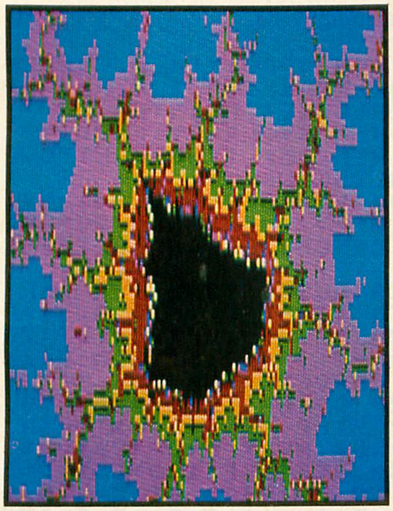
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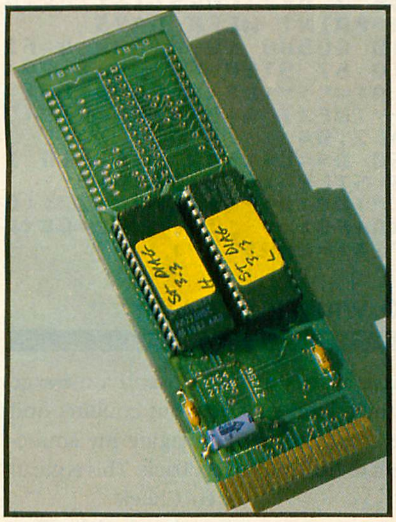
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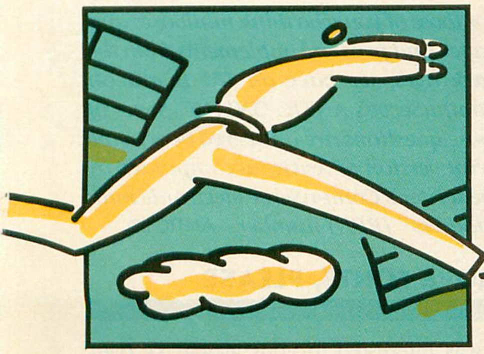
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Editorial submissions should include program listing on disk or cassette, and text file on media and paper if text was prepared with a word processor. Media will be returned if self-addressed stamped mailer is supplied. **Antic** assumes no responsibility for unsolicited editorial material.

i/o board

ABOUT THE COVER

The fractal images on **Antic**'s cover and inside this issue's **ST Resource** were created with our own *3-D Fractals* program, then altered with DEGAS software. The 32K of pure screen information was then transferred to an IBM PC capable of converting it to magnetic tape, which was then processed by a Scitex Response 350 system, resulting in four-color separated film. The Scitex system is a sophisticated combination of computer and laser in which the actual film dots are placed by computer-controlled laser.

APPOINTMENT CALENDAR PRINTOUTS

Several **Antic** readers have sent in modifications for *Appointment Calendar* (**Antic**, January 1986), to make it work with additional printers. Two of these modifications are printed below. However, please note that if **Antic** does not have these printers in-house we are unable to test the modifications.

James K. Briant of Tuxedo, NY modified the program for his **Panasonic KX-P1091** printer. The lines listed below are modified from the original listing. The printer must be operated in the Std.Pgm. mode when printing the calendar. If you want faster printouts, then replace "n" in lines 900 and 1050 with "P" for draft quality print. CHR$(27);"n"; could also be added to line 790 for a Date printout in near letter quality print.

```
4 REM APPOINTMENT CALEN
DAR MODIFICATION FOR PA
NASONIC KX-P1091 PRINTE
R
5 REM BY JAMES BRIANT
6 REM (c) 1985, ANTIC P
UBLISHING
870 OPEN #F2,F4,F0,"P":
? #F2:? #F2:? #F2;CHR$(
27);"A";CHR$(F10);CHR$(
27);"Q";CHR$(137):E=F0
900 ? #F2;CHR$(18);CHR$
(27);"n";CHR$(F14);D$:?
 #F2
1000 NEXT A:? #F2;D$;CH
R$(27);"P";CHR$(F15)
1050 ? #F2;CHR$(F18);CH
R$(27);"n";:IF D(F7) AN
D D(F7)<DAYS THEN 940
```

Larry Kubo of Santa Rosa, CA sent the following modification that will enable *Appointment Calendar* to print out on a **Hewlett Packard Thinkjet** printer. It produces three pitches: expanded, normal and compressed.

```
4 REM APPOINTMENT CALEN
DAR MODIFICATION FOR HP
 THINKJET PRINTER
5 REM BY LARRY KUBO
6 REM (c) 1985, ANTIC P
UBLISHING
900 ? #F2;CHR$(F14);D$:
? #F2:? #F2;CHR$(20):RE
M CANCEL EXPANDED PITCH

910 GOSUB 1080:FOR A=F1
 TO 67 STEP (F11-0.5):D
$(A,A)="+":NEXT A:D$(76
)="+":? #F2;D$:REM PRIN
T HEADER LINE
920 D$=BK$:FOR A=F1 TO
67 STEP (F11-0.5):D$(A,
A)=U$:NEXT A:D$(76)=U$
930 RESTORE 180:FOR A=F
1 TO F7:READ A$:C=LEN(A
$):B=A*(11-0.5)+0.5-INT
(C/F2+0.5)-F4:D$(B,B+C-
F1)=A$:NEXT A
935 ? #F2;CHR$(18);D$:R
EM PRINT WEEK DAYS
940 GOSUB 1080:FOR A=F1
 TO 67 STEP F11-0.5:D$(
A,A)="+":D$(A+F6,A+F6)=
"+":NEXT A:D$(76)="+":?
 #F2;D$
950 D$=U$:FOR A=F2 TO 1
04 STEP 16.5:D$(A)="
  ":D$(A+F5)=CHR$(27):D
$(A+F6)="-1▯      ▯":D$(A
+F14)=CHR$(27)
```

NO WRITER'S CRAMP

I have always wanted to send a message to the editors of **Antic** but couldn't find the energy to write. Imagine my amazement to find online feedback. This is great!

Ken Cheek
Fort Lauderdale, FL
PPN 72337,375

*For those of you who think mailboxes and paper and pens are implements from the dark ages, we have an I/O Board on CompuServe's ANTIC ONLINE. Some of those questions are answered here in the print version of **Antic**, accompanied by the writer's CompuServe electronic mail "address" (PPN) number.*—ANTIC ED

MORE FONTS, PLEASE

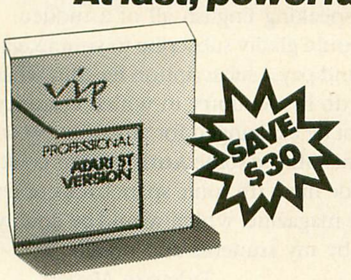
I was interested in your article *ST Font Loader* but failed to see its practical use. I am searching for a word processor which

continued on page 8

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	Soundwave for Atari ST	44.95	2.50	
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i/o board

continued from page 6
would permit use of various character sets, so I could do word processing in French and Greek, for example. I'm sure many Atarians in North America and elsewhere have a need for such a word processor. Is such a product in the making?

Elias Leousis
Kirkland, Quebec
Canada

Font Loader was designed as a tutorial program to demonstrate ST font structure. It will load ST fonts to the screen *in any software that maintains the GEM desktop menu. A truly practical font program, such as the one you described, would require a printout of the redefined fonts and a graphics-capable printer. We do not know of any software developer undertaking such a project at this time.*—ANTIC ED

BIG LETTERS

This program helps you make letters two times the normal size by modifying the Atari special characters set. The [CONTROL] characters form the top portion of the larger letters, and the lowercase letter character set becomes the bottom portion of each letter.

Dorian Garson
East Brunswick, NJ

```
1 REM TALL TEXT
2 REM BY DORIAN GARSON
3 REM (c) 1985, ANTIC P
UBLISHING
5 GRAPHICS 0:POKE 82,0:
POKE 710,0
8 ? :? "▌▁●▗▘  ●◢▖ ▌●▌─
▖ ─▖▌▖▄─▘▖"
9 ? "antic  the atari r
esource"
10 CHBAS=57344:CH=38912
:CAPS=256:TOP=208
15 POKE 756,CH/256
20 FOR X=CHBAS TO CHBAS
+1024:POKE CH+X-CHBAS,P
EEK(X):NEXT X
30 FOR X=CHBAS+CAPS TO
CHBAS+CAPS+TOP STEP 8
40 FOR L=0 TO 4:FOR T=0
 TO 1
50 POKE CH+(X-CHBAS+CAP
S)+(L*2)+T,PEEK(X+L)
60 NEXT T:NEXT L:NEXT X

70 FOR X=CHBAS+CAPS TO
CHBAS+CAPS+TOP STEP 8
80 FOR L=4 TO 8:FOR T=0
 TO 1
90 POKE CH+CAPS+(X-CHBA
S+CAPS)+(L-4)*2+T,PEEK(
X+L)
100 NEXT T:NEXT L:NEXT
X
```

ON WRONG TRAK?

A few weeks ago, a not-so-brilliant friend of mine jammed two diskettes into my once-great, Trak AT-D2 disk drive. Obviously, the drive no longer works. It acts as though there is no disk in the drive, except for when it reads the first sector after about five minutes. None of the local shops know how to fix it and American TV says it can't be done. I would really appreciate any help to trak (ha ha) down someone who can fix it. I don't want to throw away a $400 drive.

Jason Knapp
Fresno, CA
PPN 74746,1331

According to Computer Support, our Northern California Atari Service Center, even before Trak went out of business over one year ago the company did not furnish necessary schematics and parts to independent repair outlets. If your drive requires a proprietary part, such as a chip, no *repair shop will be able to fix it. You may be in luck, however. Computer Support says it sounds as if you simply have an alignment problem. If you send the drive to them at 52 S. Linden Ave. #1, South San Francisco, CA 94080—via UPS with your day and evening telephone numbers—they'll take a look at it for free. And if it can't be serviced, they will send the drive back to you.*
— ANTIC ED

POLAND TEACHER

I am 27, a teacher of English at the University of Krakow and I have my own Atari 800XL which I have tried to use for the purpose mainly of teaching vocabulary. I have also used some adventure games which is interesting for how it makes students involved in the plot. When this happens, they forget their native tongue and start speaking English all of a sudden.

I would gladly subscribe to your magazine and pay a subscription fee. But what can I do in a country in which currency cannot be exchanged for any other Western one? Maybe some **Antic** readers could provide me with some spare back copies of the magazine, which would be doubly used by my students and myself.

Tadeuszn Menert
ul.Rozyckiego 5/7
31-324 Krakow
Poland

DOS 3 IMPERFECT

I am having trouble making a backup copy of Data Perfect by LJK Enterprises. The program is not protected and the manual states that a back-up copy can be made. When I use the duplicate function of DOS 3 with my Atari 800XL computer and 1050 disk drive, I get Error Message 176. I called LJK and they said it should work—but it doesn't!

Steven Chandler
Nanuet, NY

***Antic** has consistently recommended that readers should **not** use DOS 3.0. It's incompatible with virtually everything. Trade in your DOS 3.0 for 2.5 by contacting Atari Corp. Customer Service at 1196 Borregas Ave., Sunnyvale, CA 94086, or obtain a public domain version of compatible DOS 2.0 from a users group or any **Antic** monthly disk. See the April and July 1985 issues of **Antic** for more information.*—ANTIC ED

STAY WITH ATARI!

I had been looking at both the Amiga and the ST for the past few months, trying to decide which to buy in replacement for my Atari 800. Last weekend I saw an ad for the ST and decided to give it another look. The computer store owner was very enthusiastic and gave me an extensive demonstration of the ST's features. But af-

i/o board

ter a while, I noticed something strange—everything else in the store was Commodore!

It turns out that although the store specialized in Commodore hardware and software, their initial enthusiasm for the Amiga quickly waned when the first two demo machines kept crashing and had to be returned. They claim the Amiga has some extensive bugs in the operating system and that promises for Amiga software went unfullfilled. Disillusioned by Commodore, they decided to try out an Atari 520ST. Now they claim it can do virtually everything the Amiga can do at half the price, right down to the bouncing ball demo.

I had basically decided on the ST before I visited them (Atari loyalty plus a tight wallet). But after leaving, I was positive I had made the right choice. So to all of you Atari hackers who are still on the fence I say—stay with Atari!

Steve Marshall
Las Vegas, NV

WELCOME BACK, ELECTRONIC ARTS!

The response of your readers to **Antic** editorials is growing. We have received quite a few letters, and because of the interest shown by Atari users, we are planning the following hit products for the Atari 800 in 1986:

- Adventure Construction Set
- Heart of Africa
- Mail Order Monsters
- Marble Madness
- Racing Destruction Set
- Skyfox
- Software Golden Oldies (Software Country)
- Ultima IV (Origin Systems)

We hope to see at retail the kind of response we have seen in our mailbox!

Trip Hawkins
President
Electronic Arts

antic online

Worldwide Users Network

Tax Template Help Online
Plus Latest Atari News From Hanover Fair

TAX TEMPLATE HELP

Type GO ANTIC when you log onto CompuServe in March. ANTIC ONLINE is where you'll find any last-minute changes or new instructions for the *1985 Federal Income Tax Template* that's published in this issue.

And yes, your time charges for accessing any online tax preparation information are tax deductible!

HANOVER BULLETINS

Atari expects to premiere some powerful new hardware in mid-March at West Germany's Hanover Fair, the largest electronics trade show in the world. For the fastest and most detailed Atari news from Hanover, type GO ANTIC when you log onto CompuServe in March. **Antic** publisher James Capparell will have a full report about the latest European Atari activities on ANTIC ONLINE, the news service that brings you all the in-depth Atari information *first*.

SIGNING UP

If you're not a CompuServe subscriber yet, see your local computer dealer or phone (800) 848-8199 for information about signing up. Ohio residents phone (614) 457-0802. There is no extra charge for accessing ANTIC ONLINE.

help!

JOYSTICK QUEST

I cannot find a single original Atari joystick anywhere. Can anyone help me?

Harry T. Edwards
PPN 72337,400

See "De Re Atari" article in next month's ***Antic.***—ANTIC ED.

XE-TERM XMODEM

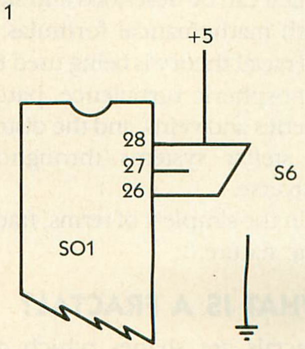
Sig * Atari Sysop Ron Luks tells us that the Atari XM301 modem review (**Antic**, March 1986) was incorrect in stating that the modem's XE-Term software downloads CompuServe .BIN extender files by working with the "A" file transfer protocol. Instead, XE-Term users should select CompuServe's own version of XMODEM for .BIN file downloading.

EPROG WIRING

There are two errors in the *EPROG* instructions (December 1985). Pin 9 of IC 9 is not labeled on the schematic. Pin 9 is connected to Pin 10 of the same chip. R3 in the parts list for the power supply should read 10K. The part number is correct.

Reader Elmo Ferguson suggested this *EPROG* modification for those who wish to burn a 27128. (See *Figure 1.*) This will allow you to burn the 16K EPROM by switching the 27128 in two 8K banks. You burn the lower 8K as if it was a 2764 and then switch and burn the upper 8K. This is accomplished by switching address line 13 (pin 26) to low (ground) or high (+5V) on the 27128.

Figure 1



Add switch S6 to EPROM socket SO1

FRACTALS FOR YOUR ATARI

MATHEMATICS IN PICTURE FORM

Everybody's talking about fractals—what a breakthrough these complicated "non-Euclidean" mathematical shapes are for creating realistic computer graphics.

But few people really understand what fractals are, or how they're used to simulate natural phenomena in new computer games such as LucasFilm's **Rescue on Fractalus** and **Koronis Rift**.

WHY STUDY FRACTALS?

Fractal theory forms a primary link between mathematics and nature, a link that conventional mathematics had long been straining to achieve.

Coastlines are *not* curves, trees are *not* tubes, and clouds are *not* globes. But, all of these are fractal shapes which can be described and simulated with mathematical formulas.

Fractal theory is being used to study atmospheric turbulence, patterns of arteries and veins, and the distribution of stellar systems throughout the universe.

In the simplest of terms, fractals imitate nature.

WHAT IS A FRACTAL?

Fractals are shapes which are "infinitely squiggly."

Imagine a shape with an infinite perimeter (outer edge), but a finite area. You might draw a circle around such a shape in a moment, but you'd need an eternity to trace it precisely.

The coastline of Britain is a popular example of a fractal. In the following mental exercise, our task will be to find the *exact length* of this coastline.

This is not as simple as it sounds. Coastlines are usually quite irregular, and cannot be represented with smooth curves. Every inlet, bay and peninsula contributes to the total length of a coastline.

We can estimate the length of a coastline with a satellite picture of the island. Unfortunately, a photograph taken from that altitude would not show all of the bays and peninsulas which would contribute to the length of the coastline.

So let's come a little closer.

If we drove a car around the coastline of Britain, keeping our left wheels in the water and our right wheels on the beach, our total mileage would be a better estimate of its length. But it would still be an estimate. We'd still miss the countless tiny bumps and irregularities too small to drive around accurately.

We'd run into the same problem if we walked around the coastline, crawled around the coastline with a ruler, or measured every bit of the coastline through a microscope. No matter how closely you examined it, there would always be wrinkles and bulges beyond the range of your instruments, and these wrinkles and bulges would contribute to the coastline's length.

In the real world, we can imagine "zooming in" on a coastline until we're looking at molecules and atoms. In the realm of mathematics, we deal with numbers, and our imaginary "zoom lens" is no longer limited by the size of atomic particles. We can "zoom-in" on a mathematical coastline *infinitely*. The shape defined by such a coastline is *fractal*.

EXAMPLE:

Consider points A and B on this mathematical coastline. From a satellite picture taken at an altitude of 200 miles, we estimate that there are 10 miles of coastline between the two points. A satellite picture taken at 100 miles reveals many smaller bays and

BY CHARLES JACKSON
ANTIC PROGRAM EDITOR

peninsulas too small to be seen at higher levels. From this new information, we now estimate the length of the coastline between A and B to be 15 miles.

HAUSDORFF DIMENSION

Mathematicians put both estimates into a complex formula which yields a number called the *Hausdorff Besicovitch dimension*—D. The Hausdorff dimension acts like a ratio of the new estimate to the old estimate. (In the previous example, D is approximately equal to 1.176.)

In other words, if we are zooming in on a coastline at a constant speed, the Hausdorff dimension is proportional to the rate at which our coastline estimates grow. If we discover only a handful of new bays and peninsulas each time we zoom, D will be slightly greater than one.

On the other hand, if we discover a great many bays and peninsulas with each zoom, D will be slightly less than two.

As D approaches two, however, the coastline become so irregular that our bays begin to close into lakes, and our peninsulas begin to split off into islands. Since lakes and islands are not part of a coastline, D must be greater than one, but less than two.

The topological dimension, D_T, refers to the definition of "dimension" we learn in basic geometry, such as two-dimensional shapes and three-dimensional shapes. Circles, for example, have a topological dimension of two, while spheres have a topological dimension of three.

The Hausdorff dimension of all simple geometric shapes (including circles, polygons and ellipses) is always equal to the topological dimension.

A *fractal* is defined as a shape whose Hausdorff dimension is greater that its topological dimension.

In other words, fractals have *fractional Hausdorff dimensions.* Although Benoit Mandelbrot created the term *fractal* from the Latin *fractus*, meaning "fragmented" or "irregular," many authors have also used the term as a mnemonic device for "fractional Hausdorff dimension."

JULIA FRACTAL CURVES

Perhaps the most celebrated fractal shapes are the *Julia Fractal Curves*, nicknamed the *Mandelbrot Set*. The fractal images in this issue are examples of such curves.

The curves are created through an iterative process published in 1906 by French mathemeticians Gaston Julia and Pierre Fatou.

An iterative process is a task done over and over again until one or more conditions are met. A FOR-NEXT loop is a good example of an iterative process.

This iterative process we're concerned with, called *self-squaring*, is based on the formula:

$$Z \rightarrow Z^2 + \mu$$

Here, Z and μ are complex numbers. Z refers to a particular point in the complex plane, and μ is a complex constant. (See the accompanying story for more information about complex numbers).

Our iteration has several steps: For every point Z, we will:

1. Set a counter equal to zero.
2. Multiply Z by itself, and add μ.
3. Set Z equal to this new value.
4. Calculate the size of Z.
5. Increase the counter by one.
6. If the size of Z is greater than or equal to 2, jump to step 9.
7. If the counter is greater than 100, jump to step 9.

continued on page 13

COMPLEX NUMBERS EXPLAINED

Meet the square root of -1

Engineers and mathematicians use complex numbers to deal with many involved functions and algorithms. A complex number, such as 4+6i, is a number made of two parts—a *real* part (4) and an *imaginary* part (6i).

A real number is a common, ordinary number, such as 12, -.003 and 22/7. We count with real numbers, do our taxes with them and use them for numbering magazine pages.

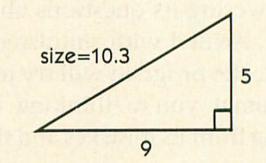
An imaginary number is a real number multiplied by i, where i is the square root of -1. In the physical world, negative numbers do not have square roots—hence the name "imaginary." Although it's difficult to visualize i, it is frequently used in many equations, including the ones which generate our self-squared Julia fractal curves.

These curves are mapped onto the complex coordinate plane or grid. A complex coordinate plane looks like a piece of graph paper. One coordinate represents the real part of a complex number, and the other coordinate represents the imaginary part. For example, the complex number 9+5i would be plotted nine places to the right, and five places up. This is analagous to plotting the point (9,5) on an (x-y) grid. The complex number 0+0i would be plotted at the (0,0) point of this graph.

COMPLEX NUMBER SIZE

The *size* of a complex number refers to its distance from 0+0i. We can visualize this by imagining a right triangle in which the length of one leg is equal to the real part of a complex number, and the length of the other leg is equal to the length of the imaginary part. The size of this complex number would be equal to the length of the triangle's hypotenuse.

Triangle built from 9+5i



We can use the Pythagorean Theorem to determine this value. In the above example, we used the complex number 9+5i. The size of this number is equal to: SQR(9^2+5^2) or approximately 10.3.—Charles Jackson

GUESS THE ANIMAL

A DECISION-TREE IN YOUR ATARI

This is an Atari BASIC adaptation of a well-known artificial intelligence simulation game. The program tries to guess what animal you are thinking of—and it "learns" by remembering your answers. Animal Intelligence will work on all 8-bit Atari computers of any memory size, with disk or cassette.

Animal Intelligence is a BASIC version of the classic text-oriented artificial intelligence game. Put your Atari's barnyard brainpower to the test by answering its questions about an animal. Armed with simulated intelligence, the program will try to guess the animal you're thinking of. By learning from its mistakes and the data you give it, the program amasses a large database of knowledge. The longer you play the game, the smarter the database gets. After you've been at it a while, you may be surprised at the apparent "intelligence" of your computer.

However, at the start of the game, while your computer is less educated, the conversations can be unintentionally hilarious.

COMPUTER: Is it a mammal?

YOU: No.

COMPUTER: Does it swim?

YOU: No way.

COMPUTER: Is it extremely stupid?

YOU: Yes.

COMPUTER: Is it a computer?

YOU: Boy are you dumb!

COMPUTER: Come on, yes or no?

YOU: Yes!

COMPUTER: That was fun! Want to try again?

BIT OF HISTORY

Text-based games like Animal Intelligence are among the earliest examples of artificial intelligence programs.

The first successful attempt at simulating a verbal exchange between computers and human beings was Eliza, programmed by Joseph Weizenbaum in the mid-'60s. Considered the first computer "therapist," Eliza interacted with her patients by simply rephrasing and reflecting what they said.

Animal Intelligence is actually more advanced than Eliza. It has the ability to store and call upon a substantial database of information and learn from its mistakes.

Programs like Animal Intelligence and Eliza are most easily written in word-oriented languages such as LISP or Logo. These languages support list processing, a method of processing data in long, chained lists. I wanted a version in good old BASIC, a more universal but number-oriented language. Unable to find a BASIC version, I set about writing one of my own.

PLAYING THE GAME

Type in Listing 1, ANIMAL.BAS, check it with TYPO II and SAVE a copy before you RUN it.

The computer will ask you, "Think of an animal. I will try to guess it by asking questions about it. Is it a mammal?" After you answer YES or NO, you can respond with any word that

BY RANDY DEARDORFF

begins with Y or N or simply the letters Y or N. The computer considers your response and asks another question. This process continues until the computer runs out of questions and makes an "educated" guess.

If the computer guesses correctly, it will ask whether you want to play again. If it guesses incorrectly, it will give up and ask you what kind of animal you were thinking of. Then it asks you to type a question that would be answered YES for the correct animal and NO for the wrong animal it guessed.

For example, suppose you were thinking "zebra" but the computer guessed "horse." The computer adds the new animal to its knowledge base, but still needs a way to distinguish the two. Now suppose you typed the question, "Does it have stripes?" in response to the computer's request. The program now knows that zebras have stripes and horses don't. It will use that information later to discriminate between the two.

It's vital to save your computer's knowledge base to disk or tape—this knowledge is what makes the game fun. To save, type [CONTROL] [S] and you'll be prompted for a device to save the file to, and a filename. Cassette users should simply type C: at the prompt. Disk drive owners type D: and then the filename. To LOAD a previously saved knowledge base, press [CONTROL] [L] and respond to the prompt as explained just above.

KNOWLEDGE TREE

You don't need to know how Animal Intelligence works in order to use it. But for those interested, here is a brief description of the theory behind the game:

The game's intelligence is rooted in a tree-like knowledge structure. Each point where the tree has "branches" (or nodes) consists of three bits of information—a question to ask, a YES branch, and a NO branch. The terminations (tips) of the branches consist of a single bit of information—in this case, an animal.

During play, the program branches through the tree from the bottom to the top, stopping at each node to ask a question and branching according to the user's response. When it reaches a termination, its guess is the animal it finds there.

When the computer guesses incorrectly, the tree "grows" by creating a new node at the termination. Remember that a node is formed of a question, a YES branch, and a NO branch. To create the new node, the program uses the question you provide. It then places the new animal you have given it at the termination of the YES branch. The animal that was at the old termination gets pushed up the NO branch. Thus, what was previously a single termination becomes a node with two terminations, and the tree grows a little taller.

To get Animal Intelligence to work properly in BASIC, a language which lacks list processing ability, I had to divide the knowledge base into three parts. The first and second are simulated string arrays—AX$ holds the animals, and QX$ holds the questions. The third part, TREE$, is the knowledge tree.

Though it is an ordinary string, TREE$ functions as a matrix of pointers. Every three bytes comprise a node or termination. The first byte of a node is a pointer to a question held in QX$. The second and third bytes point to the YES branch and NO branch respectively. The first byte of a termination is a pointer to an animal held in AX$, while the second and third bytes are just dummies at the start. Later they will be used as pointers when the termination grows into a node.

Animal Intelligence isn't limited to animals, however. With some simple modifications, I've created knowledge bases of plants, rocks and minerals, even famous people. Kids seem to especially enjoy the program. And as an educator, I can attest to its value as a tool for learning.

Randy Deardorff is a former science teacher currently employed in laboratory information management by the U.S. Environmental Protection Agency. He has been programming the Atari since 1982.

Listing on page 96

FRACTALS
continued from page 11

8. Goto step 2.
9. *Stop iterating* and remember the value of the counter.

Once we reach step nine, if the value of the counter is greater than 100, our point lies within the Julia curve. Such points are conventionally colored black.

Other counter values will produce other colors. For example, points which yield counter values between 0 and ten may be colored red, values between 11 and 25 might be colored blue, and so on.

By performing this iteration on every point on the computer screen, we can create our own Julia curves. We can also vary our starting coordinates and the complex constant, μ, to create an infinite variety of fractal shapes.

The programs in this issue will help you create your own Julia curves. The 3-D fractal program, written for the 520ST, creates striking three-dimensional fractal images which closely resemble rugged mountain ranges, colorful valleys and winding rivers.

The Fractal Zoom program, written for 8-bit Atari computers, creates fractal shapes in a variety of graphics modes, and then lets you continually "zoom-in" on any part of them.

FRACTAL ZOOM

SPECTACULAR ZOOM-LENS EFFECTS

by CHARLES JACKSON, **Antic** Program Editor

We've read about fractals. Now let's make *some! This BASIC program lets you create, save and zoom in on your own Julia fractal curves. You can also load and zoom in on fractal curves created previously. The program runs on all 8-bit Atari computers with 32K and a disk drive.*

A fractal is a complex geometric shape that has an infinite number and variety of corners, twists and curves. These shapes are used to study and simulate natural phenomena, such as turbulence, blood circulation, or landscapes.

The LucasFilm game **Rescue On Fractalus** ($40, Epyx) uses a fractal algorithm to generate a realistic landscape. The closer you "fly" to this landscape, the more detail you see. The game uses fractal algorithms to create an entire planet of intricate mountainous landscapes.

Rescue On Fractalus plots several lines of a fractal curve to create an initial horizon line. Then, the program alters the scale of the graph to simulate flying "to" and "from" this horizon.

Fractal Zoom will draw self-squared Julia fractal curves in any one of five different graphics modes. Once a fractal curve is drawn, the program lets you repeatedly "zoom in" on any piece of it.

Type in Listing 1, FRACTAL.BAS, check it with TYPO II and SAVE a copy before you RUN it. If you have trouble with the special characters in lines 610, 730, 980-982, and 1630, don't bother typing them in. Listing 2 will create these lines for you, and store them in a disk file called LINES.LST. Simply RUN Listing 2, type NEW and LOAD Listing 1 (without the above lines) and then ENTER "D:LINES.LST". Remember to SAVE the completed program before RUNning it.

Fractal Zoom is probably the most time-consuming program you'll ever run. It takes a *long* time to generate a fractal image. Although some images can be created in as little as 40 minutes, these fractal curves aren't very interesting to look at. For the really attractive fractal curves, you should allow 12-48 *hours* for each image.

An entire Julia fractal curve is displayed in Figure 1. This is the image you get when you use the program's default data. Zooming in on the framed area in Figure 1 produces Figure 2. The result of several more zoom cycles is seen in Figure 3. The arrow in Figure 2 points to the area depicted here.

SELF-SQUARING

The algorithm used to create these images centers on an iterative process called "self-squaring." This process, described in detail in the previous article, is based on the formula:

$$Z \rightarrow Z^2 + \mu$$

Here, Z and μ are complex numbers. Z represents a point in the complex plane, μ is a complex constant. Since computers cannot work with complex numbers directly, we must write our own complex number routines. These routines are in lines 320 and 330 in the BASIC listing, and in the *draw_fractal()* routine in the C listing for ST fractals appearing elsewhere in this issue.

If you're not comfortable with complex numbers, you can think of self-squaring as a "black box." You put your Z value into the top of the box, and two values come out of the bottom. One of these is the new value for Z, the other is a measurement of Z, called Size.

Every point on the screen has its own unique Z value. To process a point on the screen, we take its Z value and stick it into our self-squaring black box. If the resulting Size value is less than two, take the new value of Z, place

it back in the black box and try again. If Size remains less than two after 100 tries (or iterations), then the point on the screen is inside the Julia curve, and should be colored black. Points for which Size reaches two after 10 iterations, for example, will have a different color. The color of a point depends entirely on the iteration count.

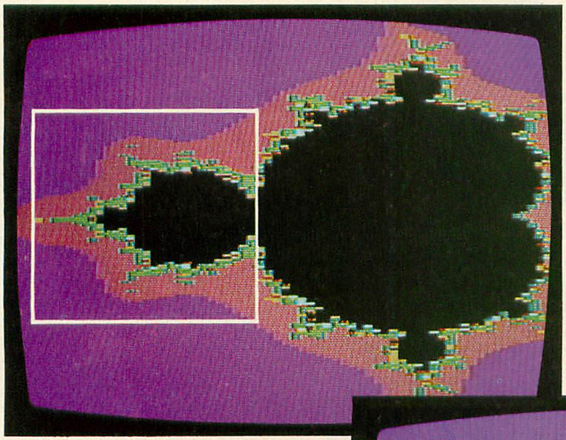


Figure 1



Figure 2

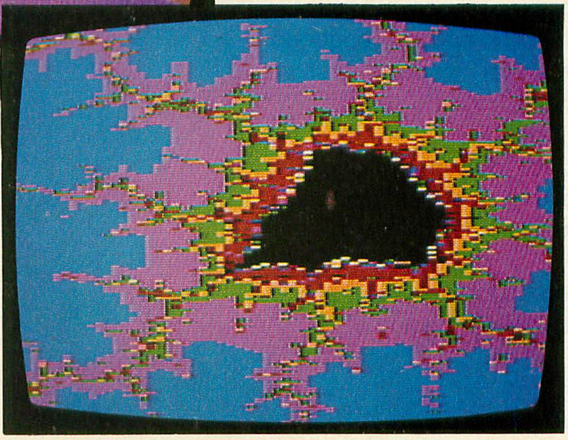


Figure 3

THE MATH

In our complex number routines, AZ and BZ correspond to Z, a number in the complex plane. AZ is the real part of Z, and BZ is the imaginary part. Likewise, AC and BC correspond to μ, the complex constant, where AC is the real part of μ, and BC is the imaginary part. See this issue's Complex Numbers Introduction for more details.

Step 1:
The first step in self-squaring is to multiply Z by itself (hence the term "self-squaring"). Since BASIC doesn't know how to deal with complex numbers, we'll have to break each complex numbers into real and imaginary parts, and separately process each part.

In this example, the complex value Z^2 becomes:

$(AZ+BZ)^2$ where AZ is the real part of Z, and BZ is the imaginary part. This expression is equivalent to:

$(AZ+BZ) \times (AZ+BZ)$ and expands into:

$AZ^2 + 2*AZ*BZ + BZ^2$

An imaginary number can be expressed as a real number multiplied by i, the square root of (-1). (In other words, $i^2 = -1$.) Since BZ is an imaginary number, squaring it yields $BZ^2 \times i^2$, which is equal to $BZ^2 \times -1$, or $-(BZ^2)$. And $-(BZ^2)$ is a real number.

Since AZ^2 and BZ^2 are both real numbers, we can add them together to find the real part of our solution to Z^2. (Remember, BZ^2 is a *negative* value, so we'll be subtracting BZ^2 from AZ^2.)

We're still left with the $2*AZ*BZ$ term, which is the imaginary part of our solution to Z^2.

Step 2:
The second step in self-squaring is to add the complex constant μ. In our BASIC program, AC represents the real part of this constant, and BC represents the imaginary part.

Once we've determined the real and imaginary values for Z^2, we simply add AC to the real part of our answer, and BC to the imaginary part. Line 320 calculates the real part of our answer, and line 330 calculates the imaginary part. These become the real and imaginary values for our new Z.

We calculate the Size of our answer in line 350. The Size of a complex number is equal to:

SQR(real $part^2$ + imaginary $part^2$)

If the Size of our answer does not exceed two, we take our new Z value and put it through our self-squaring algorithm again. Keep inserting each new Z value into the algorithm until its Size is greater than two, or until we've been through the algorithm 100 times.

In the BASIC program, COUNT keeps track of how many times we've been through the algorithm. If COUNT reaches 100, the corresponding point on the screen is colored black. Other values of COUNT yield other colors. In Fractal Zoom, COUNT may range between 1 and 101. The program uses a series of formulas to convert COUNT into an appropriate color value. These formulas lie in lines 1500-1550.

These formulas expect COUNT to range between 1 and 101. Many times, however, COUNT will have a much smaller range. If we're zooming in on a very tiny portion of the curve, for example, COUNT may only range between 40 and 60. This range would only use the middle colors of our available color spectrum.

If we know the maximum and minumum values of

continued on page 19

continued from page 17
COUNT, however, we can re-scale our color formulas to work over any range. To do this, we must plot the entire Julia curve, remembering the maximum and minimum COUNT values, modify our color formulas according to these values, then re-plot the curve using the new colors.

To save a little time, we'll also store each COUNT value in a disk file. This way, we only have to compute COUNT once for each point. Once the program creates its new color formulas, it can retrieve the values of COUNT from the disk file, instead of recomputing the entire curve. These routines are in lines 502-508.

If you're plotting your curve in Graphics 8 (a two-color mode), or if your COUNT values range between 1 and 101, the replotting is not necessary and is skipped.

When the computer is done, your curve is saved to disk as a 62-sector picture file. The data you used to create the picture is also saved as a one-sector data file. The file used to store your COUNT values is erased.

You'll need 62 sectors for the picture file, and up to 246 sectors for COUNT's temporary data file.

OVERNIGHT SUCCESS

This is why Julia curves take so much time (and disk space) to create correctly. The computer must cycle through the self-squaring routine up to 100 times for every point on the screen. That's from 15,360 points for a GTIA screen, to 61,440 points for a screen in Graphics 8 (ANTIC Mode F).

We've streamlined the program to increase its speed. For example, we've removed the SQR operation from the Size routine in line 350. Now, instead of comparing the square root of the variable SIZE to two, we eliminate the square root operation, and compare it to four. The math is the same, but we've eliminated BASIC's snail-paced SQR routine.

You may also want to turn off the display screen and the ANTIC chip, which increases processing speed by up to 30 percent. If you want to turn off ANTIC, answer N at the SCREEN ON (Y/N)? prompt. If your screen is off and you want to take a glimpse of your "fractal curve-in-progress", you can re-enable the screen display by holding down the [SELECT] key. Once you release it, the screen will go black again.

If this is the first time you're using the program, you should leave the screen *on*. This way, if a mistyped program line causes the program to crash, an error message will appear. (Error messages are invisible when the screen is shut off).

THE PROGRAM

Make sure you've got *plenty* of disk space before running the program. Your picture file will require 62 sectors, and your temporary data file will need between 123 and 246 sectors. When the program is through, this data file will be replaced by a one-sector data file. This file will contain the information the computer used to draw the curve.

When RUN, the program first asks whether you want to create a fractal curve, or to load one from disk. Antic Disk subscribers will find a ready-made fractal curve on the disk, under the filename D:JULIA.

CompuServe subscribers can find the same files in the Atari 8-bit forum, Data Library 4, under the filenames JULIA1.XMO and JULIA2.XMO. (Identical .BIN versions are also available for TSCOPE users). JULIA1 is the 62-sector picture file, and should be renamed D:JULIA. JULIA2 is the one-sector data file, and should be renamed D:JULIA.DAT.

If you're running the program for the first time and you don't have an Antic disk subscription or access to CompuServe, you'll have to create a fractal curve from scratch.

CREATING A FRACTAL

When you choose to create a fractal curve, the computer will ask you what graphics mode you'd like to use. Fractal Zoom can draw Julia curves in Graphics Mode 8 (high resolution, two colors), Graphics 9 (medium resolution, 16 shades of one color), Graphics 10 (medium resolution, 9 colors), Graphics 11 (medium resolution, 16 colors of one luminance) and Graphics 15 (ANTIC mode E, medium-high resolution, 4 colors).

Next, you'll be asked if you want to leave the screen on during processing. Again, if you're using the program for the first time, answer by typing Y.

Now, you'll be prompted for a filename for the completed image. Make sure your filename does not have an extender! For example, D:FRACTAL is an acceptable filename, but D:FRACTAL.PIC is not. If you enter an improper filename, the computer will beep and reply BAD FILE NAME, and then ask you for another filename.

Finally, you should enter values for ACORNER, BCORNER and SIDE. ACORNER and BCORNER are the real and imaginary Z values which correspond to the upper-left corner of your screen. SIDE determines the magnification value. Large values of SIDE yield smaller fractal curves, while smaller values of SIDE yield larger images. If you don't know which values to use, just press [RETURN] to use the default values printed at the bottom of the screen.

The computer will plot the fractal curve, beginning at the top left corner of the screen. When it's done, the computer will automatically save the image to disk, and a DONE message will appear. Press [START] to view the image and to begin the ZOOM routine.

DISK FRACTAL LOADING

You can load and zoom in on any fractal curve previously created with this program. Just choose the LOAD ONE FROM DISK option and type in the filename of the image to be loaded (no extenders allowed). The computer will load the picture data. It will also examine the corresponding data file to determine the graphics mode to be used and the values for ACORNER, BCORNER and SIDE. Press the [START] key to view the image.

ZOOMING

Once you've created or loaded a fractal curve as described

continued on next page

above, press the [1] key, and a small frame will appear in the upper-left corner of the screen. This is your zoom window. You can move the window with a joystick plugged into port 1. You can vary the size of the window by pressing any of the number keys (0-9). The [1] key will produce the smallest window, and the [0] key yields a full-screen window.

Fractal Zoom will take the image within the zoom window, and expand it to fill the entire screen.

Choose an appropriately sized window, move it over an interesting portion of the Julia curve, and press the joystick button. The screen will clear, and you'll be asked for a filename for your new image. You'll also be asked whether or not you want the screen display turned on.

This done, the computer will begin plotting your new fractal image, starting at the top-left corner of the screen. When it's done, it will save the picture and data to disk. You can continue zooming in on an image almost indefinitely.

NOTES & HINTS

If you own a 130XE and are familiar with its RAMdisk, you can use it to hold your temporary data files. Just change line 55 to read RAMDSK=1 and your scratch files will be written to D8: but your picture file and the permanent data file will still be written to a floppy disk.

Fractal curves are self-similar. That is, the edge of a fractal curve viewed at low magnification will look just about as jagged as one viewed at high magnification. Until you become familiar with the program and the Julia curve you're working with, you should only use the larger zoom windows. When using the smaller zoom windows, it's too easy to "get lost" inside an unfamiliar fractal curve.

Each time you zoom, you reveal curves and squiggles too small to be seen previously. When you use large zoom windows (lower magnifications), you'll only see a handful of new squiggles. If you use small zoom windows (higher magnifications), you'll reveal so many new squiggles that your new image may be unrecognizable.

There are many Julia curves throughout the complex plane. The one generated by the default data in Fractal Zoom is only one of many possible curves. The more adventurous (and patient) users may want to enter their own values for ACORNER, BCORNER and SIDE, and search for their own Julia curves.

The most interesting parts of Julia curves seem to lie in the filaments—the tiny "hairs" that appear to grow out of the body of the curve. Zoom in on one of these for a special treat. And don't be surprised if you discover a few miniature Julia curves hiding in these filaments!

(Kudos to any programmer who finds a way to replace the self-squaring loop—in lines 310-400—with one or two mathematic equations. The equations should accept variables AZ, BZ, AC, BC *and return a* COUNT *value. An algebraic proof of the equations must also be submitted. The best solution, in the judgement of the editors, will be published in these pages.*—ANTIC ED)

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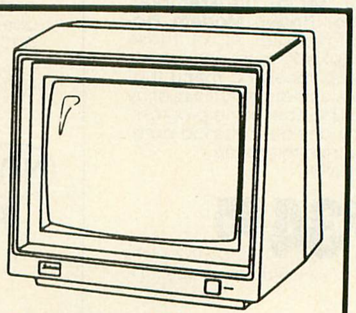
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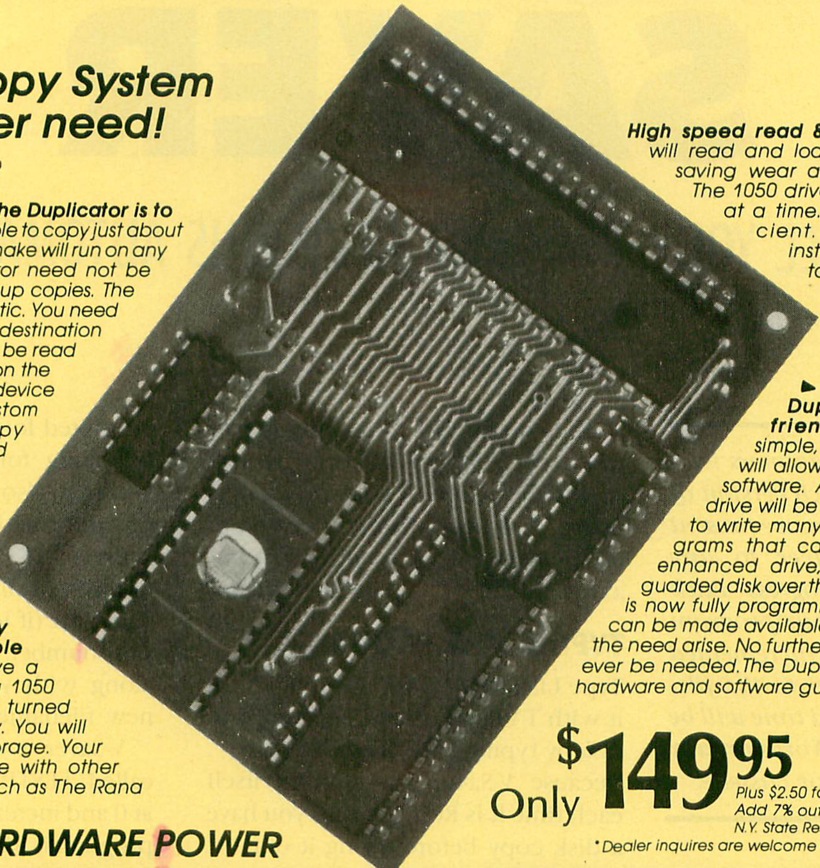
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For those BASIC programmers who can't keep track of which version of code they're working on, we present V-Saver. Append V-Saver to any BASIC program in progress. Each modified version of your program will be saved with an incremented version number added to the filename, and the date and time will be included in the code. Works on any 8-bit Atari, with disk or cassette.

Most programmers develop a habit of SAVEing intermediate versions of a program under development. Making copies of your program every half-hour or so could prevent immense frustration and wasted time if a power failure or similar mishap occurs.

But with all these different SAVEs, it's hard to keep track of which version you are working on, or what filename to use next. Using the same name over and over is no good because sometimes it is necessary to go back to a previous version and start again.

The solution: Let your computer do the work. V-Saver will keep a record of which version of your program is active, and decide what filename to use next. It will also, optionally, put a date and time stamp in the program.

TYPING THE PROGRAM

Type LISTING 1, VSAVER.LST, check it with TYPO II, then LIST a copy to disk by typing LIST "D:VSAVER.LST". Because V-Saver will modify itself each time it is RUN, be sure you have a disk copy before trying it out.

USING THE PROGRAM

After you have begun to create a new program, merge V-Saver to it by typing ENTER "D:VSAVER.LST". This will append a 12-line BASIC program to your own program in lines 31499 to 31600. As long as you don't use any line numbers in this range it will not interfere with your own program.

When you are ready to save a copy of your program type GOTO 31500 [RETURN] in the immediate mode (no line number). You will be prompted for a date and time in the following format: 09/13/85 06:00. You may also choose *not* to type in this information.

BY DONALD WAHL

Press [RETURN] and V-Saver will modify itself to include the new date/time (if you added it) and a version number. It will then save itself, along with your program, under a new filename.

V-Saver is set up to create files called, TESTPROG.VS#, where # starts at 0 and increases by 1 each time your program is SAVEd. After 9 is reached, V-Saver will reset the version number to 0. To see the current filename and date, type LIST 31570,31575 [RETURN] from immediate mode.

The V-Saver program only needs to be ENTERed once and it will remain in your program until removed. It can be removed at any time by typing GOTO 31590 [RETURN] from immediate mode. When the final version of your program is ready, type GOTO 31590 [RETURN] then SAVE your program under its final name.

PROGRAM TAKE-APART

The normal mode of operation for Graphics Mode 0 is for the editor device (E:) to read from the keyboard

and write to the screen using IOCB0.

By changing bit 0 of IAUX1 in IOCB0 we can force the editor to read from the screen. The net result is the same as the result of repeatedly pressing the [RETURN] key. This is often referred to as "forced read mode." V-Saver modifies itself by printing the new lines on the screen, then entering the forced read mode.

Line 31499—Protects your own program from falling through to V-Saver.

Line 31500—Establishes a Graphics 0 screen.

Line 31510—Gets date and time from user and prints it on the screen. If you don't want a date/time stamp, leave this line out. The line also clears all strings and variables which could cause problems during debugging. If you want to examine your variables after a trial run you'll have to do it before RUNning V-Saver.

Line 31520—LISTs the current file name from line 31570 on screen and positions the cursor over the version number. Changing the POSITION 26,3 statement will allow different file name lengths. If you use 3 fewer characters in the file name, then change 26 to 23.

Line 31530—Determines the character under the cursor held in address 93, and checks whether it is numeric. The values in the range check, 16 to 25, are the internal codes for the numbers 0 to 9. You can change these to allow any range of single character numbers or letters to be used.

Line 31540—Increments the version number and stores it in the cursor save location. Resets the number to minimum value if maximum is met. If you changed the internal codes in line 31530 then put your high and low values here also.

Line 31550—Sets up forced read mode to input new lines 31570 and 31575 and starts it with POKE 842,13.

Line 31560—Stops forced read mode.

Line 31570—Saves file under new file name.

Line 31575—Date and time.

Line 31590—Establishes a Graphics 0 screen and prints the line numbers needed to delete V-Saver

Line 31600—Prints the last line numbers and POKE 842,12 to stop the forced read mode then starts a forced read mode to actually delete V-Saver.

RENUMBER UTILITIES

If you use a renumber utility, LIST lines 31570 and 31575 to disk (LIST "D:VLINES",31570,31575). Then delete VSAVER by typing GOTO 31590. Renumber your program. Finally, reenter VSAVER (ENTER"D:VSAVER.LST) and lines 31570 and 31575 (ENTER"D:VLINES).

Donald Wahl of Dunkirk, Maryland is making his first appearance in Antic.

Listing on page 100

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ADVAN COMPILER BASIC

POWERFUL NEW ATARI LANGUAGE

This is important. **Advan Compiler BASIC** is a spectacular new language for 8-bit Atari computers. Yes, another BASIC—but never has a language given the programmer such an effortless command of the special sound and graphics capabilities of the Atari.

Advan Language Designs' BASIC is not a compiler for Atari BASIC, like the MMG Compiler. It is an expanded BASIC with powerful new commands. I suspect that Advan BASIC will revolutionize public domain programming. It is even suitable for certain kinds of commercial software development. But most of all, Advan is the ideal language for hackers who program for the pure joy of it.

COMPILED BASIC

A compiler "translates" BASIC into machine language after you write the program, instead of "interpreting" it every time the program is run. That's what makes Advan so much faster than an ordinary interpreted BASIC. This translating (called compiling) usually involves an extra step that can often be complicated and inconvenient. But Advan BASIC has followed the lead of the ACTION! language, with a compiling step that is effortless.

Programming Advan BASIC feels just like Atari BASIC. The commands and the screen editor work pretty much the same way and it is all very familiar. However, you get syntax checking with English error messages when you type in a line. When you finish the program, you type RUN. The screen goes blank while the program compiles, and then the program RUNs. If there is a runtime error you are dumped back into BASIC and the offending lines are LISTed with English error messages. Very convenient, very neat, very fast.

BUILT-IN P/M

Graphics are one of the Atari's strengths and Advan BASIC puts that power at your fingertips. For example the GRAPHICS command, in addition to its normal uses, can enable Player/Missiles and declare a custom character set. The SETCOLOR command has separate parameters for hue and luminance. No more reaching for the calculator to figure your color code.

Player/Missile graphics are supported with a command that moves your player for you (just specify the direction and speed), automatically changes your player to create animation (just tell it how fast to change) and can either move your players independently or synchronize them. Other commands detect collisions, create and locate your players. The PDISPLAY command lets you design your players with binary digits. For example the following fragment creates player #2 starting on 105th line of your screen.

```
10 PDISPLAY 2%,ADR(30),105%
20 GOTO 40
30 CODE"4,&10000001,
&01000010,&00100100,
&00011000"
40 REM the rest of the program
```

If you are familiar with players, you will recognize the bit map for a player that's four lines high in the shape of a V. This kind of code will be a breeze to debug.

The percent signs [%] after some of the numbers indicate that these are integers. By specifying which numbers are integers and which are real (floating point), you can make your program much smaller and faster.

More graphics power: Advan BASIC will do Display List Interrupts for you! This means you can display dozens of colors or players or character sets or

BY CHARLES CHERRY

almost anything else on a single screen. And nothing could be easier. Use the SETINT@ command, tell it what register, what value to put in it and when to do it. You are allowed eight interrupts, but each of them can be changed as often as you wish. This is a truly wonderful feature. Creating Display List Interrupts and changing them are things which many assembly language programmers find difficult. Promised future enhancements will do custom Display Lists and smooth scrolling. Creating these effects in BASIC will make the owners of other computers curl up and die.

Sound only gets three commands, but they allow you to play entire songs. Also, the songs play in the background during the Vertical Blank Interrupt and do not affect the rest of your program. The ASOUND command assigns the voice and a line number where the program can find coding for the music (not unlike the PDISPLAY command above). SCONTROL starts and stops the voices independently or together. The SOUND command is the same as in Atari BASIC.

FAST AND EASY

Everyone says benchmarks are meaningless. But this time they are instructive because of the way the code is written. The benchmarks time themselves. Here are the lines of code that do it:

Every other Atari BASIC—

```
10 POKE 18,0:POKE 19,0:
POKE 20,0
20 REM the benchmark goes here
30 SECONDS=(PEEK(20)+256*
(PEEK(19)+256*PEEK(18)))/60
```

Advan BASIC—

```
10 RTIME
20 REM the benchmark goes here
30 SECONDS=TIME/60
```

Advan BASIC is filled with shortcuts like this. By the way, it ran my version of the Sieve of Eratosthenes in 13.8 seconds. The MMG compiler took 9 seconds, BASIC XL took 67 seconds and Atari BASIC hasn't finished yet. If that isn't fast enough, you can rewrite key routines in assembly language from within BASIC. Advan BASIC recognizes assembler mnemonics almost as if they were BASIC keywords. Not only is this great for people who know assembly language, but it can be a teriffic learning environment too.

Of course people use their Ataris for things besides games and graphic demos. Is Advan BASIC up to "serious" programming? It has all the commands of Atari Basic. It also has string arrays. Although strings are limited to 255 characters, string and numeric arrays can go to 64 dimensions! It supports lots of Microsoft-style string functions—including LEFT, RIGHT, MID—and search functions that find bytes and sub-strings within strings. It also has commands to insert bytes and words into strings.

COMMAND COMPLEMENT

Program control is very comprehensive. Commands include IF-THEN-ELSE, a multi-line variation IF-DO-ELSE-ENDIF, the very powerful CASE, WHILE-WEND, REPEAT-UNTIL and WAIT. If you have only used Atari BASIC, you won't recognize some of these, but once you have used them, you will wonder how you got along without them.

A complete complement of algebraic functions are included. So are I/O commands. Binary loads and saves are done by a special usage of the GET and PUT commands. The INPUT command can print a prompting message, and there's a variation that accepts strings containing commas. The LOAD and SAVE commands assume a disk drive, so all you have to type is LOAD Myfile. No "D:—what a relief. DOS commands which can be called directly from BASIC are DIRectory, KILL (delete), RENAME, LOCK, and UNLOCK.

If all this is not complete enough for you, Advan BASIC supports user-defined functions and named subroutines (procedures). These can pass as many as four parameters. You can build a library of your own commands, just as you would with PASCAL, ACTION!, or C. Advan promises that programmer's utility disks are coming soon.

The price of Advan's power is paid in memory space and Atari BASIC incompatibility. Advan has been very clever in optimizing memory usage. But the BASIC appears to take up about 17K. On the XL and XE models, 14K of this will flip up under the operating system to give you more runtime room. On the 800 this 14K is erased. Advan is not yet recommending the language for the 800, because you have to reload BASIC after each run. I found this only a minor nuisance and recommend it heartily. Advan's built-in DOS is Atari 2.5 compatible and supports the 130XE RAM-disk. But you will not be able to use any other DOS, a disappointment to owners of double-density and high-speed disk drives.

Advan BASIC is not compatible with Atari BASIC and that is a real shame. So many good programs are waiting to be transformed by the Advan magic. Even when saved in an untokenized form, Advan programs are not the same as Atari BASIC programs. I just hope Advan produces a conversion utility without delay. Also, Advan BASIC compiles to a pseudo-code that requires a 3K runtime package. The copy protection prevents you from duplicating this package. While I sympathize with the author's desire to protect his brilliant work, I do feel that Advan BASIC must produce stand-alone programs. Advan promises an extra-cost runtime package. I hope they will reconsider and include it on the original disks.

I do not have space to detail all of the other treasures to be found in this wonderful and unique language. The Atari community owes author William Graziano a large measure of gratitude for this super creation. In today's market, it will be very hard to succeed in establishing a new 8-bit BASIC language. I wish Advan the very best. In the meantime, send away for your copy today. You will not regret it.

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- ☐ Music Construction Set
- ☐ Pinball Construction Set
- ☐ Seven Cities of Gold
- ☐ Archon II : Adept
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- ☐ Archon
- ☐ Financial Cookbook
- ☐ Music Construction Set
- ☐ Pinball Construction Set
- ☐ Seven Cities of Gold
- ☐ Archon II : Adept
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- ☐ M.U.L.E.
- ☐ Realm of Impossibility
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- ☐ Movie Maker
- ☐ M.U.L.E.
- ☐ Realm of Impossibility

IBM
PCjr, PC, & comp.

- ☐ Dr. J. & Larry Bird Go One-On-One
- ☐ Archon
- ☐ Financial Cookbook
- ☐ Music Construction Set
- ☐ Pinball Construction Set
- ☐ Seven Cities of Gold

Please send my free software to the following address. I have enclosed the required Proofs of Purchase and $5 (check or money order payable to Electronic Arts) to cover the cost of shipping and handling ($7 Canadian).

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Proof of Purchase: Send us the following two items: 1) the dated cash register tape or receipt showing the product you purchased, and 2) find the Command Summary or Reference Card inside the package you purchased. Cut off the part number on the back, lower-left-hand side of the card, or the product name from the front of the card. Send these two items and $5 for shipping and handling ($7 Canadian), along with the coupon, to **Electronic Arts, "Buy 1, Get 1 Free," P.O. Box 7530, San Mateo, CA 94403.** This offer expires May 31, 1986. Open to residents of the U.S.A. and Canada only. Only the products listed are available for this promotion. No substitutions will be accepted.

(no dogs included...)

Let's face it. Buying home software can be a risky proposition. Good software costs a lot of money. Cheap software practically rolls over and barks. But look at this.The titles listed below are Electronic Arts' greatest hits. They've all scored on the "top twenty" best-seller charts. Between them they've won over 60 product quality awards – making them the most honored products in the home software industry. Best of all, there's no longer any reason to swallow hard when you think about treating yourself to quality software. Because now you can:

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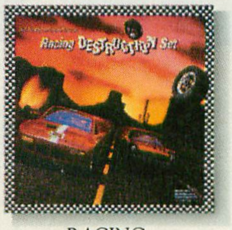
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The best-selling computer sports simulation of all time.
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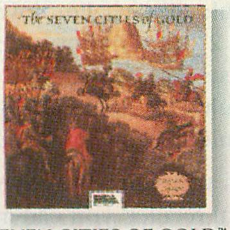
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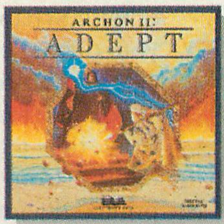
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ARCHON™
Like chess with arcade battle action.
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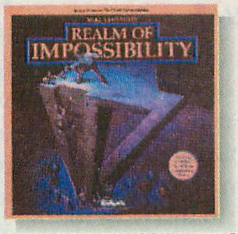
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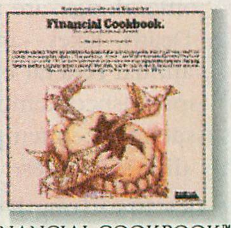
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ELECTRONIC ARTS™

INCOME TAX SPREADSHEET

ANTIC'S ANNUAL I.R.S. SYNCALC TEMPLATE

***Antic's** 1984 Federal Income Tax spreadsheet template was one of the most popular features we ever published. So we asked Contributing Editor Ken Harms to prepare a 1985 IRS template as soon as the year's tax information was finalized. Now you can do your '85 federal tax on your 8-bit Atari. Requirements are: minimum 48K memory, a disk drive and **SynCalc** spreadsheet software ($49.95, Broderbund/Synapse).*

BY K.W. HARMS
ANTIC CONTRIBUTING EDITOR

Some things are inevitable. Death, taxes—and **Antic's** annual Federal Income Tax spreadsheet template.

This issue's type-in template—and monthly disk—includes:

1985 IRS 1040 Long Form
Tax Tables X, Y and Z
Schedule A (Itemized Expenses)
Schedule B (Interest & Dividends)
Schedule G (Income Averaging)
Form 2441 (Child Care Deduction)
Schedule W (Working Couples)

To use the 1985 template, you'll need an 8-bit Atari with at least 48K memory, a disk drive and **SynCalc** spreadsheet software ($49.95, Broderbund/Synapse). You'll also need your official Internal Revenue Service 1985 tax instructions and forms.

You don't *need* a printer to benefit from this template. Just copy the figures from the screen to your printed IRS forms by hand. But if you do use a printer, SynCalc lets you enter control characters for creating special printout effects—such as boldface, underlines, double-width, boxes and arrows, page breaks, etc.

FIVE EXTRA FORMS

Five specialized additional schedules and forms—which couldn't fit into this month's Listing Section or Antic Disk—are also available on disk from the Antic Catalog by mail. See the advertisement elsewhere in this issue for details about ordering. The disk costs $15 and contains all forms published in this issue—plus these extras:

Schedule C (Business Income & Expense)
Schedule SE (Self Employment)
Form 2106 (Employee Business Expenses)
Schedule D (Capital Gains)
Schedule E (Rents & Royalties)

And if you can't find SynCalc at your local retailer, you can also purchase this software by mail from the Antic Catalog. This issue's advertisement for the template disk also explains a special SynCalc offer.

FINDING HELP

Even if you've never used SynCalc before, you should be able to work your way through the well-written manual in a few hours and learn enough to use the tax template. However, if you are a first-timer, you could be letting yourself in for unnecessary aggravation if you load in the spreadsheet and start working on your taxes without becoming familiar with SynCalc first.

To look for any last minute fixes, changes, or new instructions *on the template itself*, log onto ANTIC ONLINE on CompuServe by typing GO ANTIC. And yes, your online time-

charge for accessing tax preparation information is tax deductible! But please—phone Broderbund, not **Antic**, if you need help learning how to operate SynCalc.

THE TAX FORMS

You'll need the 1985 IRS tax instructions and forms close at hand. There isn't enough memory in the Atari to duplicate the forms exactly, so abbreviations are used wherever possible. The template follows the IRS line numbers, so you won't get lost.

Most of us would use the Tax Tables on pages 34-39 of the '85 IRS instruction booklet to figure out exactly how much we owe. Again, there just isn't enough room in your computer for all that information. So I use the Tax Rate Schedules on page 40—which are actually the formulas from which the detailed Tax Tables are created. Figure out your Net Taxable Income on the template, and then just look up the matching Tax Table amount as you fill out your actual 1040 paper form—you'll probably find that the template results are accurate within $5-10 of the Tax Tables, no matter what your taxable income is.

But please examine your template results with great care. If you have any doubt about the accuracy of the template findings, get advice from a registered tax preparer. Data entry mistakes by users and programmer errors (even by me) have been known to occur. **Antic** and the author can't take responsibility for any mistakes that might be made in your tax payments as a result of using this template.

TAX SPREADSHEETS

Spreadsheet programs are ideal for preparing tax returns. You provide personal data such as income and deduction amounts. And then customized formulas can tell the program how to add, subtract and compute tax obligation from your data. The template in this issue does the necessary mathematics for calculating Federal Personal Income Taxes on the 1040 Long Form and the most widely used supporting forms.

Each data element or formula is entered in a spreadsheet "cell" with an address—similar to the lines and columns on the tax form. As your data changes (you find another receipt, for example), go to the proper cell, type in that single piece of data, press [START] and your entire tax return begins to recalculate.

PRESS 5 TIMES: Please note that SynCalc calculates by rows or columns—so this template must be calculated at least five times. Press [START] *five times* after changing any figure.

The spreadsheet template in this issue can be re-used for many different 1985 taxpayers. Just retain a blank version on disk. Entering the personal data for a taxpayer should be the work of only an hour or so, for most returns. Save each individual's completed tax template on disk under a different filename.

This template is narrow but quite long—nearly 250 rows (SynCalc fits only 255 rows) arranged in five columns. It starts with Form 1040. Below Form 1040 are Tax Tables X, Y and Z, Schedule A (Itemized Expenses), Schedule B (Interest & Dividends), Schedule G (Income Averaging), Form 2441 (Child Care Deduction) and Schedule W (Working Couples).

These all fit on one single spreadsheet (although there are only about five rows to spare). Therefore, the totals from any calculation (income averaging, for instance) are automatically included in the 1040 Tax Due line. You *don't* have to type in any schedules or forms that you won't be using, the 1040 form will work without them. But if you type in sections that you later decide *not* to use, just don't enter any taxpayer data into those sections and they won't become part of the overall calculations.

TEMPLATE TYPE-IN

Load your SynCalc disk into your Atari and format a blank disk for data, following the instructions in the SynCalc manual. Press [OPTION] and type the command LOAD/SAVE for the disk FORMAT command.

(Antic Disk subscribers: You'll find this template on your monthly disk under the filename TAX1040.SC. However, you'll need to boot SynCalc into your Atari before you can load TAX1040.SC as a template file, following the instructions in the SynCalc manual.)

In this article, I'm assuming that you're familiar with SynCalc. For instance, you should know how to start a command sequence by pressing [OPTION], how to move around within the spreadsheet, etc. Please consult your SynCalc manual when in doubt.

Before typing anything in, set all column widths to seven—except column E, which should be set to nine. Set GLOBAL FORMAT to PRECISION 0 (to round off cents to the nearest dollar) and COMMA (to insert commas in numbers like 1,000). To speed up data entry, issue the command GLOBAL RECALCULATE MANUAL. Also, set calculation to ROWS.

To simplify template entry, I've placed the IRS form line numbers in column A and the labels (text descriptions) in column B, with text overflow in column C. All figures and calculations are in columns D and E.

While entering titles in columns A and B, set FORMAT JUSTIFY LEFT. When entering the numbers and formulas in columns D and E, set FORMAT JUSTIFY RIGHT.

The template is separated into seven sections, one for each tax form, schedule, or table. Each section has two parts. Part A is the format setup—titles, labels, etc., with zeros [0] temporarily standing in for number and formula locations. Part B contains the formulas for that section.

I'd suggest starting at cell A1 and working down column A using SynCalc's automatic cursor movement. Then go to column B and enter the titles (some titles appear in column A on other forms). If a title extends past its column, just type it in—SynCalc's overflow feature handles the long material automatically. (But you need to erase each overflow cell manually if you move the title.)

You might consider typing Part A of one section first, then Part B. And then test that section before proceed-

continued on page 35

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That holds 360 KBYTES of information?
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INCOME TAX
continued from page 33

ing to next section. Reading from the left, Part A of each section starts with the SynCalc row number. (*DON'T* type in these row numbers.) The tax form line numbers are under the dashes for column A. You *must* enter all numbers and formulas in the exact cells shown—otherwise the template won't work.

Here's a data compression tip: SynCalc uses 16 bytes to store every number. Text entries take only four bytes, plus one byte per character. Unless you will use a number in a calculation, make it a text entry. On this template, all form line numbers must be text. Start each entry with a quote ["] or you'll run out of memory.

The last step in Part A is to enter all the zeros and FORMAT $ the indicated cells. The zeros "hold open" the cells for formulas and values that will come later. All the zeros are in columns D and E. As you enter them, use this undocumented tip: the /K command toggles automatic cursor movement on and off! One more tip: In a SynCalc menu you can use the cursor arrows without holding down [CONTROL].

FORMULA TYPE-IN

Now that the template format is typed in, use Part B of each section to type in cell formulas. The listing shows each cell address, followed by the entry. *DON'T* type the cell addresses—such as E169—shown in the first three or four spaces at the left. Instead, go to that spreadsheet cell and type in the formula, typing over the space-holding zeros you entered earlier. A formula element like E179 is not text—type it as "+E179" so that SynCalc will know it's a numeric entry. As you enter each formula, protect it with a /FO (Formula Protect Entry) so you won't accidentally write over it.

TIPS & TRICKS

Because this template pushes SynCalc to its limits, in order to get everything working properly you'll probably need to use at least some of the advanced spreadsheet operation techniques described below:

The seven template sections barely fit onto a single spreadsheet. As you work on a template, SynCalc occasionally wastes a few cells and may give you the famous ERROR 100 NOT ENOUGH MEMORY message. If this happens, immediately SAVE the file—*properly*. Now ERASE memory with the /E# command and then reLOAD the file. This SAVE/ERASE/LOAD process automatically does the "garbage collection" to delete unnecessary entries.

You'll need to pull a few tricks to squeeze in some of the longer cell formulas—such as the one in cell E71. First of all, don't type spaces between words. Even more important, leave out words like THEN, ELSE or LOOKUP when you first type in the formula. Then press [RETURN] and you will get the SYNTAX ERROR message because of your missing words. Now go back and use the [CONTROL] [INSERT] keys to enter the missing words in their proper places. If you use this method, SynCalc lets you put an "illegal" number of characters into a cell. The final characters will be pushed off the screen, but they're still in memory. (There are limits, of course—don't insert more characters than you need to.)

The next three paragraphs are primarily for experienced SynCalc users:

The Tax Table formulas use SynCalc's absolute address braces, [ ] to COPY material to cells E74 through E78, and then edit the table references. There wasn't enough space to absolute the LOOKUP table.

The following shortcut will cut typing time substantially: Enter cells E87 through E95 (or COPY and patch) and then COPY the entire block to E103 and then to E119. Be sure that the copied formulas refer to the correct spaces by moving the cursor to each cell and pressing [RETURN] to edit.

Just for your information, the formula in cell E172 illustrates multiple IFs, each with multiple conditions. SynCalc allows linking many conditions by AND or OR. Always put the conditions between the IF and the THEN. Place the next IF after the ELSE. These linked IFs and conditions give you the logic power needed to handle almost any problem.

WRAP-UP

After the complete spreadsheet template is typed in correctly, SAVE a blank copy under a name like BLNK1040 before entering any taxpayer data. Calling up the blank will let you do returns for many different taxpayers—just SAVE each return with a different filename.

Best of luck. Here's hoping that this year you get your biggest refund ever. And don't forget to deduct a portion of the cost of your computer, SynCalc and the tax template.

SYNCALC
Broderbund/Synapse Software
P.O. Box 12947
San Rafael, CA 94913
(415) 479-1185
$49.95, 48K disk

***Antic** Contributing Editor Ken Harms recently became president/CEO of MedicAlert after a lengthy tenure as Finance/Administration Vice President of the American Cancer Society California Division.*

Listing on page 108

Antic welcomes program submissions from readers. Just send us your program and accompanying article, we'll pay you if we publish them.

We prefer to see your listing and text on both *paper and disk.*

Sending us your program on cassette is also okay. But please put program copies on *both* sides of the cassette.

Always include a stamped, self-addressed envelope so your materials can be returned.

LIFE REVISITED

MINI-UNIVERSE ON YOUR ATARI SCREEN

Life is a classic computer simulation in which "cells" live and die according to a set of mathematical rules. These cells form fascinating and sometimes beautiful color patterns that continue changing—perhaps forever. This BASIC listing works on all 8-bit Atari computers with disk or cassette. A joystick is required.

"Life," as philosopher Thomas La Mance said, "is what happens while we're busy making other plans." But to the computer user, **Life** is something altogether different. William Poundstone, author of *The Recursive Universe*, calls this mathematical computer simulation "a video kaleidoscope—the Life screen is a world unto itself. It has its own objects, phenomena and physical laws. It is a window onto an alternate universe."

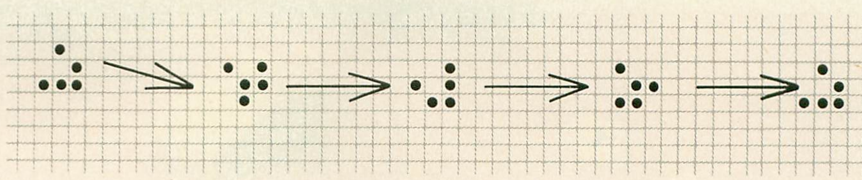
LEGEND OF LIFE

The Life game, created in 1970 by Cambridge mathematician John Horton Conway, was introduced to the world by Martin Gardner's column in the February, 1971 issue of Scientific American magazine. The program has had a cult following ever since and holds a place in history as one of the earliest achievements in both computer gaming and artificial intelligence.

Without mention of Massachusetts Institute of Technology computer wizard Bill Gosper, the history of Life would be incomplete. Conway offered a $50 prize to the first person who could prove or disprove that a population could grow without limit. In the early '70s, Gosper zealously hacked Life on a PDP-1 computer for 18 months, to the point of believing it could potentially generate life itself.

"It could run off and do something incredibly random," Gosper later told Steven Levy, author of *Hackers*. Obsessive tinkering with Life was virtually the beginning of U.S. research into what would later be called Artificial Intelligence. MIT Life hackers would sit mesmerized, staring at the pulsating screen, wondering if Life would continue growing, dying and multiplying forever.

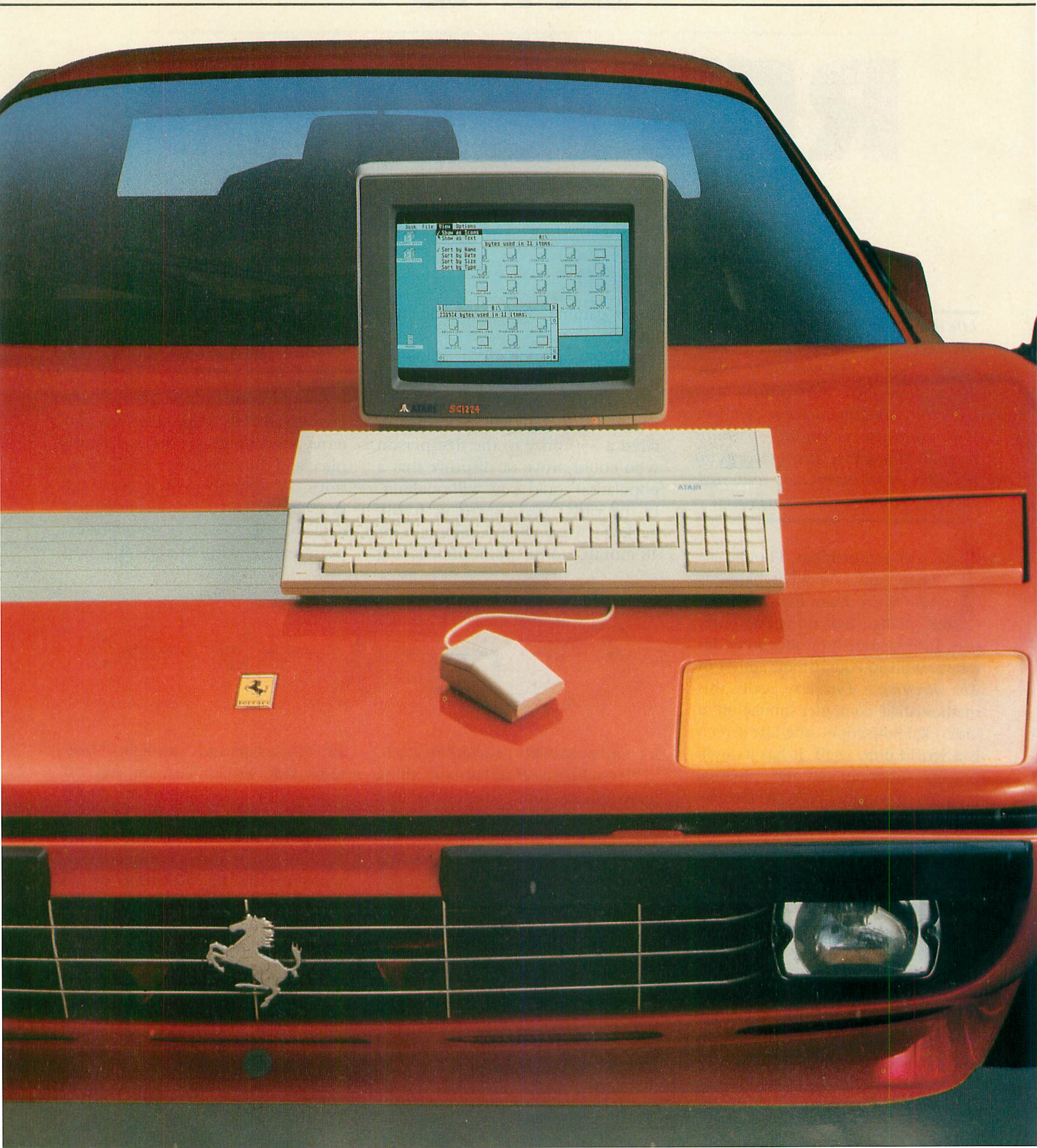
Some computer hackers found fantastic philosophical and mathematical implicatons in Life. They would experiment idly with different patterns. A Star of David on screen multiplied and then died after 247 generations. A crucifix lasted just 121 generations. Did this reflect Judaism's earlier lineage? The MIT whiz-kids experimented with spaceships and swastikas, stars and "stoplights" (patterns that would flash on and off repeatedly), searching for the meaning of Life. Gosper imagined a super computer dedicated to Life. In his hypothetical world of computer Darwinism, only the fittest cells would survive against impossible mathematical odds. After billions of generations, he theorized, the computer might create intelligent lifeforms.



PROGRAM BY CHARLES JACKSON
ARTICLE BY GIGI BISSON

Today, Life is a public-domain program you can play on an Atari computer in your own home, instead of

continued on page 40


Desk File View Options
Show as Icons
Show as Text
Sort by Name
Sort by Date
Sort by Size
Sort by Type
ATARI SC1224
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When Atari introduced the 520ST™, we set the personal computer industry on its ear.

Nobody had ever produced a machine so powerful and technically advanced for such an incredibly low price. Nobody but Atari has done it yet.

The competition was stunned.

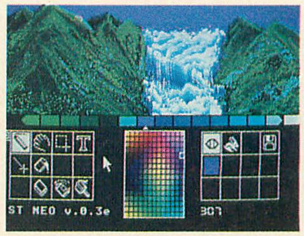
The critics wrote rave reviews.

And consumers were ecstatic.

We could have rested on our laurels, but we didn't.

Instead, Atari extended the ST concept to a new computer called the 1040ST™.

The amazing new 1040ST is even more powerful than the 520ST and years ahead of all the competition at almost any price. The only question in 1986 isn't which company to buy a computer from, but which computer to buy from Atari.



At $799, the 520ST gives you 512 Kbytes of RAM, a high-resolution monochrome monitor, 2-button mouse, and 3.5″ disk drive.

At $999, the 1040ST gives you 1024 Kbytes of RAM, an ultra high-resolution monochrome monitor, 2-button mouse, and a built-in double-sided 3.5″ disk drive, plus built-in power supply. Both the 520ST and the 1040ST can be connected directly to your own color T.V. Or you can add an Atari RGB color monitor to get the sharpest, most colorful images possible. Add $200 for color monitor.

It's simply a matter of choosing which model best fits your needs.

And whether you choose the 520ST or the 1040ST, you'll be getting the power and speed of a Ferrari for the price of a Ford.

In fact, you'll save hundreds and in some cases thousands of dollars over comparable computers. Which is why consumers are still ecstatic. Why the critics are still writing rave reviews. And why the competition is still stunned.

	ATARI® 1040ST*	COMMODORE® AMIGA™	IBM® PCAT™	APPLE® Macintosh™	APPLE IIc®
Price	$999	$1795	$4675	$1995	$1295
CPU	68000	68000	80286	68000	65002
Speed MHz	8.0	7.16	6.0	7.83	1.0
Standard RAM	1 MB	256K	256K	512K	128K
Standard ROM	192K	192K	64K	64K	16K
Number of Keys	95	89	95	59	63
Mouse	Yes	Yes	No	Yes	Optional
Screen Resolution (Non-Interlaced Mode)					
Color	640x200	640x200***	640x200	None	560x192
Monochrome	640x400	640x200***	720x350**	512x342	560x192
Color Output	Yes	Yes	Optional	None	Yes
Number of Colors	512	4096	16	None	16
Disk Drive	3.5″	3.5″	5.25″	3.5″	5.25″
Built-in Hard Disk (DMA) Port	Yes	No	Yes	No	No
Midi Interface	Yes	No	No	No	No
# of Sound Voices	3	4	1	4	1

Atari 520ST with 512K RAM, $799.

*Connects to standard color T.V. For RGB color monitor add $200.

**With optional monochrome board (non bit-mapped).

***Interlace Mode – 640x400.

ATARI®

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LIFE REVISITED
continued from page 37

requiring an MIT computer lab. You may find, alas, that Life is pretty dull stuff by 1986 standards. Or, you might go Conway, Gosper and the MIT hackers one better, and create a pattern that multiplies and lives and dies and mutates into a more complex form—computer life itself.

CREATING LIFE

Life is more like a lava lamp than a game. The player is virtually nonexistent. Life simply plays itself like a self-perpetuating game of computerized cellular solitaire.

The core of Life is a growing, dying population of "living" computer organisms. Think of this as a metaphor for a colony of micro-organisms multiplying and dividing under a blown-up electronic microscope display.

To create Life, type in Listing 1, LIFE.BAS, check it with TYPO II and SAVE a copy before you RUN it.

When the program runs, a blinking asterisk [*] cursor will appear on screen. Using your joystick, move the asterisk to the section of the screen where you want to place the first cell, and press the trigger. The cell will look like an X. To erase any X, move the asterisk on top of it and press the trigger again. The X won't be visible until you move the asterisk away from it with the joystick.

Continue doing this to create a pattern of cells onscreen. You might try a box formed of four sets of clusters of three cells each, or a crucifix composed of six cells—just about any two-dimensional shape can be used. The fewer cells you use, the faster the pattern will regenerate and grow. Watching a pattern made of 35 cells, for example, will be about as exciting as watching grass grow, and not much faster.

The fun here is in discovering which patterns will mutate and multiply—and which patterns will die after a few short generations. The shape that Bill Gosper invented, the Glider, will actually "glide" accross the screen, and return for many generations. The Glider is a simple "V" pattern composed of five cells. A hexagon formed from six cells is a "stable form"—once created, it will never change.

Unlike the complexities of real life, simulated Life has but three simple rules. Each move (or "generation") changes the pattern of cells according to these rules. The generations will alternate colors between gold and black cells on a blue screen.

1. The rule of death—A cell with four or more adjacent neighbors dies of over-population. A cell with one or zero adjacent neighbors dies of loneliness. In this version of Life, cells will also die if they hit the edge of the screen.

2. The rule of survival—If a cell has two or three cells for neighbors, it lives to the next round.

3. The rule of birth—If exactly three neighbors are adjacent to an empty cell-sized space, a new cell will be born.

Your Atari will follow these rules and do all the necessary calculations for you in a matter of seconds. Without the computer's help, you would be required to tediously figure out all possible birth and death combinations for each cell on the screen. When the computations are completed, the computer moves on to the next generation of the cell colony, and a new pattern appears.

This continues—perhaps for only a few more generations, perhaps forever—until the entire cell colony dies, or you get tired of the ever-changing display and turn off the computer.

RECOMMENDED BOOKS

WHEELS, LIFE & OTHER MATHEMATICAL AMUSEMENTS
by Martin Gardener
W. H. Freeman, 1983

HACKERS,
by Steven Levy
Anchor Press/Doubleday, 1985

THE RECURSIVE UNIVERSE
by William Poundstone
Morrow & Co., 1984

Listing on page 97

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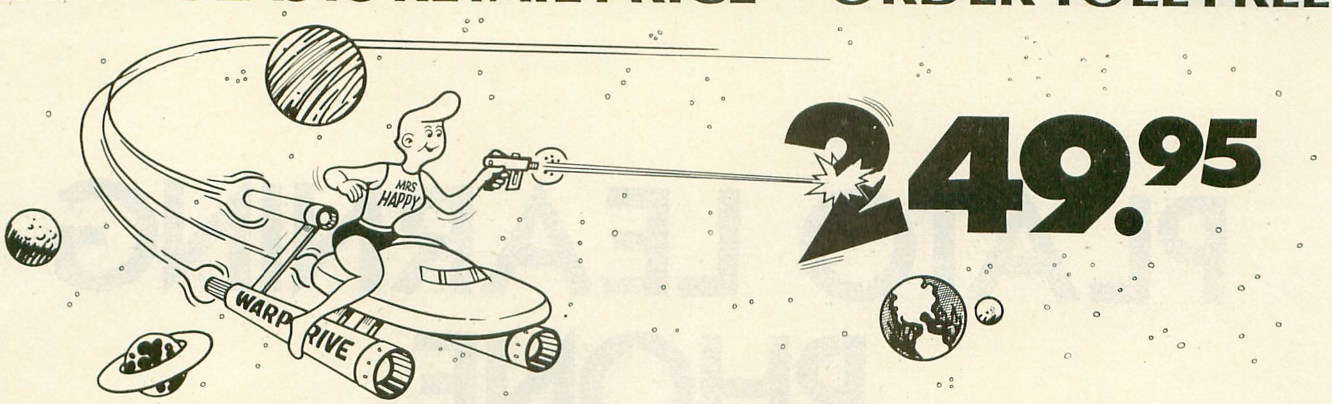
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PLATO LEARNING PHONE

Hands-on review by an 8th grader

Reviewed by VALENCY HARMS

When Atari's long-awaited **Learning Phone** cartridge for the Plato online service finally arrived at **Antic**, the editors decided they wanted a student user to write this review. Luckily for me, my name popped up and I got to use Plato for quite a few hours.

I'm fairly typical of the potential Learning Phone user. I'm in the 8th grade, not a hacker but a frequent computer user (especially all the new games) and with pretty good grades. And as a female, I break the males-only stereotype of many computer users.

Developed over many years by the Control Data Corporation, Plato is the largest educational online service in the world. Over 200,000 hours of courseware covers topics such as languages, mathematics, computer science, physics, social science, etc. The catalog lists several hundred titles ranging from the elementary (Addition & Subtraction) to way beyond me (Numerical Quadrature Methods).

(Plato Rising, *by David and Sandy Small in the July, 1984 issue of **Antic**, provides nearly seven pages of detail about Plato's structure, contents, technology and history.*—ANTIC ED)

The Atari is one of the very few personal computers that can connect with Plato. You need any 8-bit Atari computer and any Atari-compatible modem (300 or 1200 baud)—along with the Learning Phone cartridge that makes the Atari work like a Plato terminal. A printer is handy for printing out instructions.

And you'll need a major credit card in order to take advantage of the free 1-year subscription and 1-hour connect time ($32.50 value) that comes with the package.

Of course you also need a telephone to connect to all those programs on CDC's big computers in Minneapolis. In our family that was a problem. Imagine me telling my three sisters that they couldn't use the phone for a few hours because I was Platoing! If someone picks up the phone, you'll be disconnected. If you have call waiting, notify the phone company to disconnect it or suffer disconnects every time someone calls you.

Educational programs always seem expensive. Purchased programs cost $20-40 each. Plato costs $25 per year plus a user cost of $7.75 for each hour online. In my area, the phone call to the Plato access number costs an additional $6 per hour. That comes to $13.75 per hour—more than enough to quickly break my babysitting income!

Unfortunately, Plato isn't available until after 6 pm on weekdays. That means that I can't use it in my study time right after school. But it can be used just about all day on weekends and holidays.

I found that connecting the modem was simple and fully explained in the manual. Logging on was also easy to do and to remember—the manual was excellent on this topic.

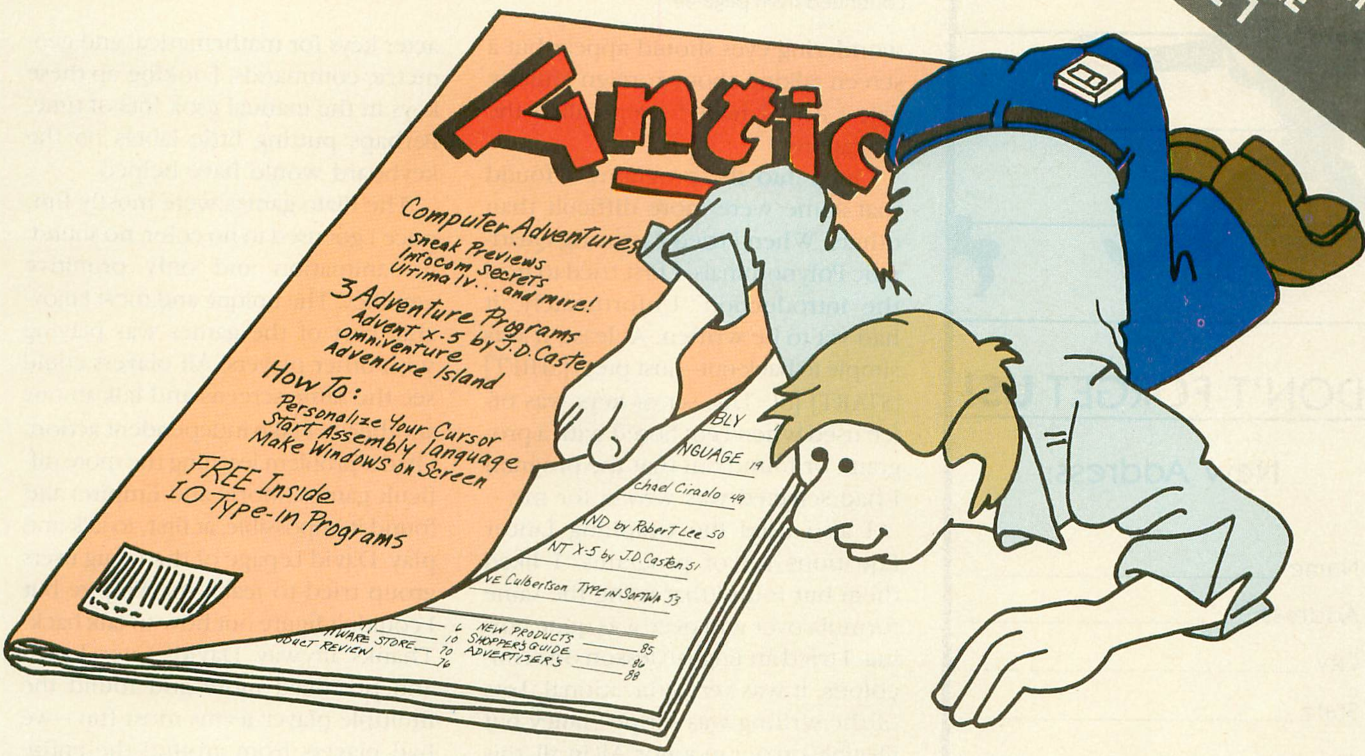
Selecting programs was also fully explained in the manual, complete with pictures. The simple main menu included Plato Programs, Electronic Mail, Graphics Design, User Information, Text Processing, File Management, Reference Aids, and Other Features. Whew! Simple commands let me explore many sub-choices easily. (I was disappointed to find that the "terminal tickler"—an online joke—wouldn't work for me.)

Although it was easy to select a program, I found that some of the titles were misleading. For instance, I chose That's Entertainment and what to my

continued on page 46

WHERE'S THE ANTIC CATALOG?

NEW ST PRODUCTS AVAILABLE APRIL 1



It's not gone, it's just getting better.

Don't worry, we'll be back soon. From now on, each quarter we will deliver a catalog that is chock full of new and classic titles. Like never before, Antic is paving the way towards an edge-of-the-art software frontier—bringing you the latest in some of the world's hottest and innovative Atari XL/XE and 520ST software.

We figured you might be curious about some of the new products to be unveiled in the next catalog. So, like good worker bees, we snuck a peek into the product development department and this is what we found.

THE FIRST GEM-BASED SPREADSHEET FOR THE 520ST.
A-CALC, By Kuma, is a multiple-window high-performance spreadsheet with ST/GEM features, for $59.95.

3D GRAPHICS ARE AS EASY AS CLICKING A MOUSE.
CAD-3D, by Tom Hudson, will create, view and animate 3-dimensional solid or wire-frame objects (with or without hidden line removal) and save them to disk. With multiple-point light source modelling in color! $49.95.

CROSSTALK™, WATCH OUT! ST TELECOMMUNICATIONS POWER IS HERE!
FLASH is to the 520ST as CrossTalk is to the IBM PC. But there's one big difference. FLASH is a **programmable** terminal package with a host of ST/GEM features (including DEC emulation and Compuserve graphics). But then, it was designed with the ST owner in mind. Totally automate your telecommunications workstation for only $39.95.

XL/XE OWNERS GET A SEEMINGLY ENDLESS SELECTION OF NEW AND CLASSIC TITLES.
Over 100 to choose from!

BULLETIN BOARD CONSTRUCTION SET—NOW FOR EVERY MODEM
Now, for 1030/XM301 and MPP modem owners—complete with all of BBCS 2.0's features. Use your imagination to build the ultimate personalized BBS. $24.95.

DON'T MISS THE CHANCE TO SEE COMET HALLEY.
Pinpoint the exact location of the comet with Antic's powerful Halley Patrol, by Jeff Mehlman (the author of Space Base). A software must for anyone with an XL/XE who wants to be a part of meteorological history in the making. $17.95.

If you want to find out more about what's coming up in the spring, be sure to get the June issue of Antic (on sale May 1st).

If you can't wait until May for the new titles, check with your local retailer. They should be on your dealer's shelves soon.

Oh . . . if you need a Catalog to hold you over, call or write Antic Catalog, 524 Second St., San Francisco, CA 94107. (415) 957-0886. **Dealer inquiries encouraged.**

CrossTalk is a trademark of Microstuff.

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wondering eyes should appear but a screen talking about Foreign Military Sales! And I hadn't even called the Pentagon!

Once into the programs, I found that some were more difficult than others. When I tried Factoring Quadratic Polynominals, I first tried to read the introduction. Unfortunately, it had yet to be written. At least, it was simple to back out—just press [SHIFT] [START] [S]. This set of keys was often used when I got bored with a program, or found out that the program I had selected was wrong for me.

I also used the Graphing Linear Equations set of programs. I liked them but found that using the same formula over and over was quite boring. I tried an English lesson on semicolons; it was very educational. Lots of the writing was script—fancy but illegible on our monitor. All in all, this was a good lesson with good content, but it got boring after a while.

On the 300 baud modem **Antic** loaned us, Plato's slowness made some programs boring. Letters echoed to the screen even slower than I type—and that's slooow! (Dad says Plato is as fast as most terminal programs, but that I had been spoiled by Atari's fast responses.) Plato's special graphic characters were painfully slow.

I tried a text file named Computer Notes and read on and on about Plato's disk file organization. Maybe it was useful for some but it was based on CDC's weird 6-bit bytes rather than the 8-bit bytes used in the rest of the world.

One of the harder problems I had to surmount was translating Plato's special command keys like [LAB] and [DATA] into Atari keystrokes. Most were simple, such as [START] [L] for [LAB]. Some were more difficult—[MICRO] was the Atari inverse video key, for instance. Then I had to remember to use [SHIFT] with some of the commands, and special character keys for mathematical and geometric commands. Looking up these keys in the manual took lots of time. Perhaps putting little labels on the keyboard would have helped.

The Plato games were mostly fun, once I got used to no color, no sound, no animation and only primitive graphics. The unique and most enjoyable part of the games was playing with other players. All players could see the same screens and talk to one another, yet take independent action. I had a problem learning the more difficult games (Moria and Empire) and found it impossible, at first, to talk and play. David Lepage of the Izbug users group tried to teach me Empire but I couldn't figure out how to talk back. Thanks anyway, David! Later, I read and practiced more and found the multiple player teams most fun—we had players from around the entire country.

There is much more to Plato than I have space or energy to describe. I didn't try all the programs (no one could!) or the electronic mail, text processing, graphics design and file management. Special features such as zooming in on a part of the screen seemed like fun too. Despite the drawbacks for the beginner, I found Plato a good learning source for kids and adults alike. I am sure that it would improve my grades. Since I was only testing Plato, I have to give it back. But my birthday is coming up really soon . . .

LEARNING PHONE
Atari Corp.
1196 Borregas Avenue
Sunnyvale, CA 94086
(408) 745-2000
$24.95, 16K cartridge

*With this professional writing debut of Valency Harms, the Harms clan from Danville, CA becomes the first family to have three members published in **Antic**.*

NEW OWNERS COLUMN

Lesson II: BASIC commands

by DAVID PLOTKIN

*New Owners Column, which began in our last issue, will teach you how to program in BASIC on Atari 8-bit computers like the 800XL and the 130XE. To start out, you don't need to know anything more than how to turn on your computer. David Plotkin, the author of this series, is a chemical engineer and a longtime **Antic** author/programmer*—ANTIC ED

In this month's lesson, you will start to learn the essential concepts you must understand before you can write your own programs in BASIC. Now is a good time to take a look at a BASIC program listing, if you have never done so. You will find quite a few BASIC listings in the Software Library section of **Antic**, including the demonstration program that is part of this month's column. Just as a reminder, when you see "D:FILENAME" in reference to a file on your disk, you should replace the word FILENAME with the name you picked for your file when you SAVEd it.

STRUCTURED BASIC

Probably the first thing you will notice about any BASIC listing is that each line begins with a **line number.** (NOTE: The BASIC listings published in **Antic** also have TYPO II code letters which we'll ignore for now. These TYPO II codes are highlighted in white, just to the left of the line numbers.) BASIC line numbers are absolutely necessary. Each program line *must* start with a line number, which can be any number between 0 and 32767. Good programming practice is to normally number your lines by 10s. That is, follow line number 10 with 20, then 30, then 40, etc.

The line number is more than just a way of directing various commands to a specific line. The line numbers also tell BASIC in what order the lines are supposed to go. For example, suppose you have two lines such as the following. (Use the [BREAK] key to get out of this program after you are done.)

```
10 PRINT "HELLO THERE, READER!!"
20 GOTO 10
```

After entering these two lines (don't forget to press [RETURN] at the end of every program line), you add another line such as the following:

```
15 PRINT "OF THE NEW OWNER'S COLUMN"
```

If you LIST your program, you will find that line 15 has been included *between* lines 10 and 20, just as you would expect. By choosing line numbers which begin every 10, you will have room to add in-between lines later—when you remember something that must be included.

Line numbers are also important when using the editing keys discussed in last month's column. You've already used the LIST command to put your program on the screen. But you can just LIST a single line by typing the line number you want to LIST after the command. For example, LIST 15 [RETURN] will put line number 15 on the screen.

To change a line, all you need to do is put the cursor on that line, type in the changes over the existing characters, and press [RETURN]. If you change only the line number and press [RETURN], you will have two lines—one with the original line number and one with the new line number. To erase a line from your program altogether, simply type the line number and press [RETURN].

continued on next page

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Finally, a warning about line numbers. You cannot have two different program lines with the same line number. If you give a new line the same line number as one already in your program, the old line will disappear and be replaced by the new line! So be careful.

Each line which requires a line number can be up to 120 characters long, including all commands and spaces. Since your screen can only display 40 characters on each line, each BASIC line can be up to 3 screen lines long.

When you are typing a BASIC line and you reach the end of a screen line, your cursor will automatically jump down to the next line. Near the end of the third screen line from where the line number is, a warning buzzer will sound. (Don't forget to turn up your volume.) Your Atari will allow you to type past the end of the third screen line, but everything past that line will be ignored—probably generating an error. A full program line, from line number to [RETURN], is called a **logical line** and can be as much as three **physical lines** long. A physical line is a row of characters from one side of the screen to the other.

As mentioned earlier, a BASIC program consists of many **commands**. Line 10 above (the PRINT statement) is an example. Line 10 contains only one command, but you may put more than one command on each line. To put additional commands on a line, they must be separated by a colon [:] as in this example:

```
10 GRAPHICS 0:PRINT "HELLO
THERE, READER":PRINT "THIS IS
ANTIC MAGAZINE"
```

FIRST COMMANDS

Last month we talked about LIST, which will display your program on the screen. However, there are additional tasks you can accomplish with LIST besides LISTing your whole program or LISTing a single line. You may also LIST a range of line numbers by specifying both ends of the range:LIST 0,100 [RETURN] will display all lines with line numbers between 0 and 100. Note that it isn't actually necessary to have lines with numbers 0 or 100!

If your Atari is connected to a printer, you can send a listing of your program to the printer by typing the following:

LIST "P:" will list the whole program.LIST "P:",0,100 just lists the lines with line numbers between 0 and 100.

Finally, you can LIST your program to the disk drive by typing:LIST "D:FILENAME" or LIST "D:FILENAME",0,100. A program LISTed to the disk instead of SAVEd (see last month) can be read with a word processor or sent easily to another computer.

An even bigger advantage comes when you reload a LISTed program back into your Atari. To do this, you type ENTER "D:FILENAME" instead of LOAD. This will merge the program you are ENTERing with the one already in the computer. After ENTERing the new program, the program in the computer will consist of all the lines from BOTH programs. If the two programs had any lines with the same line numbers, only the line from the ENTERed program will be kept.

The RUN command was also introduced last month. This command will cause the program in the computer to execute. You can RUN a program which was SAVEd to disk **without** LOADing it first by typing: RUN "D:FILENAME". Make sure the disk containing this program is in the disk drive when you type this command. If the computer cannot find the file on disk, you will see an ERROR 170 message which means "file not found." Perhaps you misspelled the filename. Try again.

To clear out all the information that is currently in the computer, you will type **NEW**. *Be very careful* about the use of NEW—there is no going back. Make sure you have SAVEd a copy of the program to disk if you are going to need it again!

One of the most useful BASIC commands is **REM**, which is short for REMark. It tells BASIC to *ignore everything* after the REM statement on that line. Programmers use the REM statement to put comments into their programs, usually explaining how the program works. This can be very useful for teaching others, and also for making changes to your own program six months later! While REM statements do not execute, they do use up memory, so you don't want to get long-winded with your explanations.

DEMO PROGRAM II

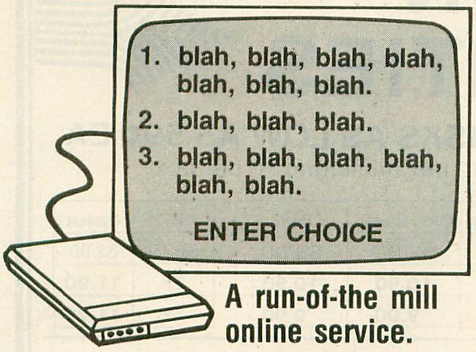
This month's demo program is another demonstration of the sound and graphic capabilities of your Atari. You still won't be able to understand a lot of the programming commands, but the program has many REM statements to explain what is going on.

When the program asks for your name, type it in and press [RETURN]. Then it will give you a message using your name in the colorful display. When you are done looking at the message, press [RESET] to get out of the program. If you use the [BREAK] key, the program will stop, but the sound will continue.

Next month, I will teach you how to use **variables**, and how to get the computer to make decisions and perform loops during the execution of the program.

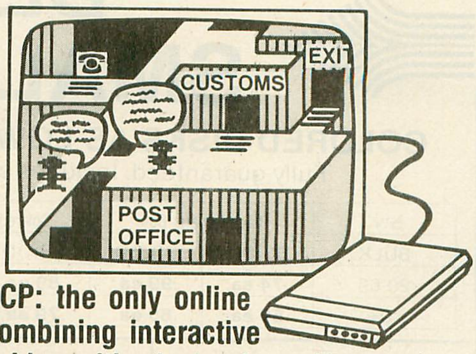
New Atari Owners will find additional details about topics covered by this series in Lon Poole's excellent book, ***Your Atari Computer,*** *$17.95 from Osborne/McGraw-Hill Publishing, Berkeley, CA.* — ANTIC ED

Listing on page 98



A run-of-the mill online service.

MODEM OWNERS: Tired of Text? Go for Graphics!



GCP: the only online service combining interactive graphics with electronic mail, downloads, AND games!

What is an online service?

An online service consists of a large, multiuser computer which your computer can access through the telephone lines. Since many people can access it at one time, you can interact and exchange information with other computer owners.

How is GCP different from other online services?

All other online services are out-growths of business information services. GCP was designed from the ground up to be a service for home computer owners. This means that GCP is easy to learn and fun to use. You can do everything you want with the joystick and function keys on your computer.

In order to provide all these capabilities, we have implemented the entire system using full color graphics. GCP is set up as a City, with buildings for the Post Office, GCP offices, Games and other services. You, and the other customers, are figures which you move around in the City with your joystick.

You mean the City is shown on my TV screen?

Yes, indeed. Not only the City, but the inside of the buildings and the games are shown on your screen in full color graphics. Additionally, the other customers are shown on your screen as they move around the City and buildings.

Isn't it slow downloading the graphics?

No, because we do not download the graphics. All the pictures of the City, buildings and games are supplied on disk. When you go from one building to another, the graphics are accessed at disk drive speeds.

Do I need special software?

Yes, very special. But don't worry, we provide it with your signup.

Can I download public domain programs?

Yes, GCP has a public domain archive in its Post Office with about a Megabyte of Atari programs you can download.

What games do you have?

At the moment, we have BioWar, CyberTank and CyberShip. Lords of Space is under development and may be done by the time you read this. All the games are played online against other customers, so you are matching wits with humans from all over the country.

BioWar is a multi-player adaptation of Conway's game of Life. Each player has a cell colony which he tries to expand, often at the expense of the other players, while contending with the problems of under- and over-population.

CyberTank and CyberShip are tactical design and combat games set on the CyberWorld, an artificial battleground for cybernetic machines. You design your own tank or ship and battle it out with up to 15 other players on a scrolling map.

Do the games use graphics also?

Extensively. For example, in CyberTank, when you design your tank, the hull is shown on the screen, as are all the equipment choices, in full color graphics. You select and place the items by using your joystick.

In the combat phase, your screen shows the status of your tank, the 1 mile area around your tank (only a part of the larger battlefield), and any enemy tanks inside that area.

What equipment do I need?

GCP supports any member of the 8 bit Atari line with 48K of memory. You will also need a disk drive and a modem. We support all the available modems for the Atari.

How much does it cost?

The signup kit includes the software and documentation you need, plus 5 free hours at standard rates. This kit costs $30. After the free hours are used up, the standard rates are $6 per hour (weekday evenings after 6pm local time and all day Saturday and Sunday) for either 300 or 1200 baud access. Daytime hours during the week are $15/hour.

Is it a long distance call?

Not from most U.S. cities. GCP is accessed through Tymnet, a national data service with over 500 locations in the U.S. The Tymnet charges are included in the standard rates, so you don't have to worry about add-on charges.

How do I sign up?

Just fill out the information requested below and send it to us with your credit card number or check/money order. For faster response, call us at:

(717) 848-2660 (VOICE)

and give us your logon name, password and credit card number over the phone.

Logon name (letters/numbers only)
[hint: keep it short]

Choices:

1st ____________________

2nd ____________________

3rd ____________________

Password (must be 6-10 chars):

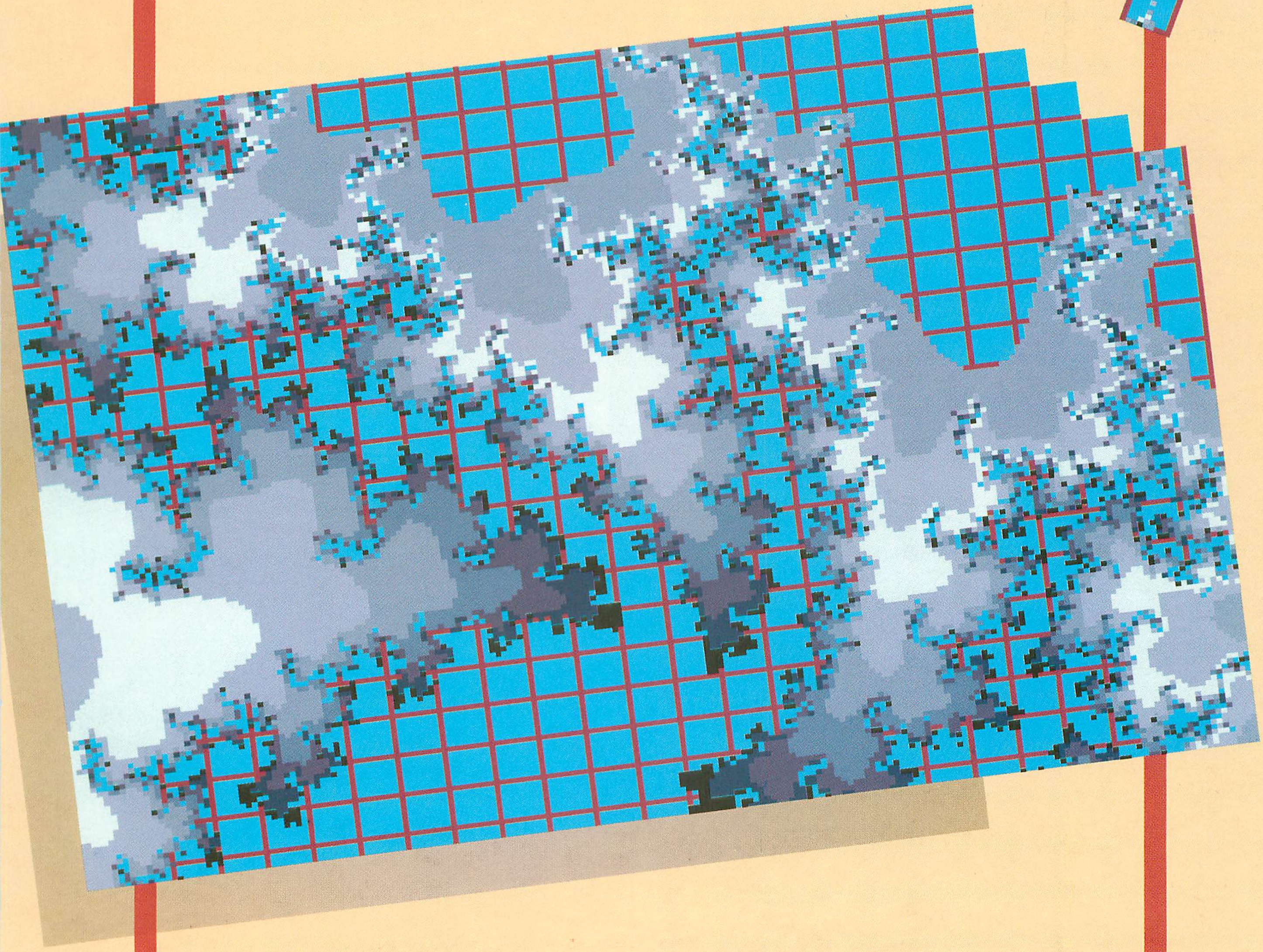
____

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ST RESOURCE™

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FRACTALS



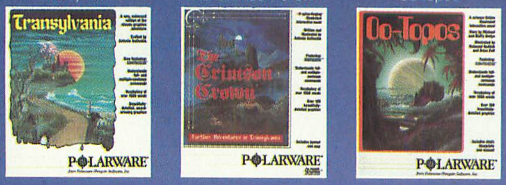
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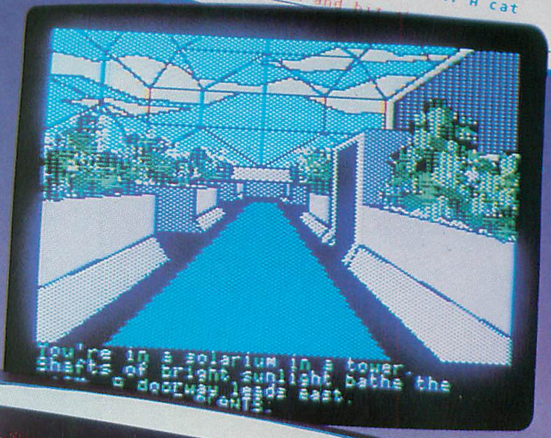
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COMPREHEND Interactive Novels are or will be available for Apple, Macintosh, Atari XL, XE, and ST series, Commodore 64 and 128, Amiga, and IBM PC and compatibles.

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VOLUME 1, NUMBER 9

Antic
The ATARI Resource

Publisher
James Capparell

Antic—The Atari Resource is published twelve times per year by Antic Publishing. Editorial offices are located at 524 Second Street, San Francisco, CA 94107. ISSN 0745-2527. Second Class Postage paid at San Francisco, California and additional mailing offices. POSTMASTER: Send address change to **Antic**, P.O. Box 1919, Marion, OH 43306.

Editorial submissions should include program listing on disk or cassette, and text file on media and paper if text was prepared with a word processor. Media will be returned if self-addressed stamped mailer is supplied. **Antic** assumes no responsibility for unsolicited editorial material.

ANTIC, THE ST & YOU

Wanted: reader comments

The Atari 520ST is a hit in the marketplace. As we go to press, Atari Executive Vice President Mike Katz confirms Jack Tramiel's estimate that "at least" 100,000 STs were sold through Christmas 1985. Whatever the number, it's clear there are many new ST owners. Some of them are previous Atari users and **Antic** readers, while others are new blood attracted by the power of the ST.

But the ST isn't simply a hit, it's a whole new ballgame. Power without the price is not just the Atari Corporation slogan—it's a phenomenal achievement. Now there's an Atari computer so different that we've been covering it with a separate section in the magazine. And this is why I'm asking **Antic** readers to write and tell me how we can best serve you in such a fast-changing market.

If you are an ST owner (or intend to be), let us know:

- Which languages interest you most—BASIC, C, Assembler, Forth?
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- What other computers do you own or use?
- What kind of special information do you want **Antic** to provide?

And if you're an 8-bit Atari computer owner who choses to stay with your present model for some time to come, we want to hear from you too! The potential of the 6502-based Atari computers has still not been fully explored. **Antic** pledges to continue supporting *all* Atari models with creative programs, information and products.

Antic became the best-selling Atari magazine by providing the best service for all Atari users. I ask for your opinions now to help us continue providing the best service for two dramatically different lines of Atari computers.

One big question we'll need to face eventually is: Would it be better to have one large, thick magazine that covers both the STs and the 8-bit Ataris? Or should all ST coverage be moved to a smaller, separate magazine when the user base is large enough? Either approach has both advantages and disadvantages, from a publishing business standpoint. So please let me know what *your* preferences are.

Whichever direction **Antic** ultimately chooses, you can rest assured that we will be here for a long time to come—with programs, new products and support for whatever Atari computer model *you* own.

Address your comments to me personally. If email is more convenient for you than sending a letter, you can reach me via the ANTIC ONLINE I/O Board. I promise that your effort won't be wasted. After all, **Antic** is successful because of our shared interests, enthusiasm and ideas.

Thanks,

Jim Capparell

James Capparell
Publisher

3-D FRACTALS

Three-dimensional ST landscapes

by PATRICK BASS, **Antic** ST Program Editor

Don't ask me to explain 'em.

Elsewhere in this issue, Charlie Jackson does a good job of introducing the concept of fractals. But I *can* move colorful, graphic images around a computer screen. So when **Antic** decided to cover fractals, I opened my mouth and said, "How about three-dimensional fractals?" All eyes swiveled expectantly in my direction, and I realized I had just volunteered.

I went off, sat down, scratched my head and began figuring how to use fractal information to create a 3-D effect.

And that, folks, is what I'm a-gonna pass on to you now. . .

JUST LIKE MAGIC

There is no magic in twisting an object on the video screen. Most of you have plotted dots onscreen in a top-down, left-right pattern, right?

Using an X,Y plotting system to get a horizontal line, you keep Y constant, and sweep X from the left to the right edge. If you add or subtract a third value, Z, to the Y component just before you plot the dot along the line—and consider the Z component the *altitude*—the resulting line will rise and fall as the Z component rises and falls. We may liken this Z line to the ridge-line of a mountain chain.

To make a diagonal line, each time you step up X, add or subtract a constant amount to Y. The result is a line that descends irregularly from upper left to lower right while carrying the Z component along with it.

HIT THE SLOPES

To simulate the slope of the view, when it comes time to start plotting the next line down, either subtract (to slope left), or add (to slope right) a small constant value to the left edge and the right edge of the display rectangle.

When we've plotted each dot, drop one dot down and draw a line from there to the *bottom* of the display, which is a value we have previously selected to cover the deepest possible valley. By drawing from back to front, we don't need to solve the "hidden-line" removal problem encountered when drawing from front to back.

That's all there is to it. No division or multiplication, just add or subtract every value except where we get the value for the Z (height) component.

HIGH/LOW COLORS

Most published fractal images have had color added to them to make the different regions stand out. On the 520ST, we have at least 16 available color values ranging from 0 to 15. If we pass the resulting color number of each X,Y point to the plotting routine as the Z compo-

nent, the resulting different "altitudes" in the final image will each be a different color. In each of our images the sea-level, or *infinity region*, is colored jet black.

Now let's put all of this together into a program. We will use the Developers (Alcyon) C package, because Hippo-C does not support floating-point math as of this writing. If you have the disk version of **Antic**, you can port the program (FRACTL3D.PRG) over into your 520ST and run it. (You'll find an ST porting HELP file on side 2 of the monthly disk.) Otherwise type in the program from the listings section.

Save the program on disk, then compile and assemble it down into a ".o" file. Link and Relmod this ".o" file together with **apstart, aesbind, vdibind, osbind,** and **libf** into an executable program, (.pgm).

RUNNING IN 3-D

FRACTL3D is completely mouse-driven and pretty much self-explanatory. It will work in any resolution. You have a choice of creating two-dimensional or three-dimensional fractals in three color palettes and then saving the images to disk as DEGAS picture files.

After you get through the introductory Alert boxes, you choose your magnification. We're going to work on the familiar Mandlebrot equation for Julia curves.

Click on the > or < to increase or decrease magnification. You can choose any value. But if you use all the default values the first time through, you are guaranteed to get a good image.

The next two boxes select the X and Y coordinates of our magnification window. Following that we must choose the vertical offset scale for the Z coordinate. This will be ignored if we later choose a two-dimensional fractal.

Now we choose between a two or three-dimensional fractal. It may be a good idea to first choose the two-dimensional image, so you can better see the differences in the three-dimensional fractal.

If you choose a three-dimensional representation, you will next be asked if you want hills or valleys. Finally, choose one of three color palettes and off you go!

The full fractal will take about 20 minutes to an hour to draw, depending on how much black space (infinity) is in the image. The more black, the longer it will take. You can abort any image in process by pressing and holding either mouse button.

When the image is complete, a box will appear permitting you to save the picture. Whether or not you choose to save your picture, you are given the choice to start all over again with the original default values.

PROGRAM TAKE-APART

The only **#include** file we need here is **osbind.h**. Below that we have a block of **#define** statements, which simply cause the compiler to replace the first constant (wherever it sees one) with the second constant. This means, for example, each time the pre-processor finds the string TRUE in the source code it will replace it with the string 1. It is a convention of C to make defines all upper-case.

The first two declaration lines save space for the in and out arrays. (See sidebar on BASIC VDI calls). Then the rest of the integers are declared—including three color palettes, Earth, Wind and Fire. The **char** declarations include all the alert box strings, and the path and filenames.

Note: Although our published listing of **alert( )** breaks at the word "written," you should type the entire alert string on a single line without a carriage return.

continued on page 55

C ROUTINE IDENTIFICATIONS

In published C listings for the ST, it is often difficult to distinguish between subroutines supplied by the GEM libraries and subroutines written by the user. We therefore offer the following guide:

Generally, any function call in C that starts with the small letter **v** will be a call to the VDI Library. Such calls would include **v_pline( ), vst_effects( )** and so forth. Even though there are a lot of them, only a few are used frequently and they can be easily spotted.

The AES Library is broken into 11 different sub-libraries, each of which are identified by their own five-character prefix on the call name. The 11 different Libraries are:

1. APPL_ Applications Library
2. EVNT_ Event Library
3. MENU_ Menu Library
4. OBJC_ Object Library
5. FORM_ Forms Library
6. GRAF_ Graphics Library
7. SCRP_ Scrap Library
8. FSEL_ File Selector Library
9. WIND_ Window Library
10. RSRC_ Resource Library
11. SHEL_ Shell Library

Using examples from the table above, those of you familiar with the C listings previously published in **Antic** will recognize **appl_init( )** as belonging to the **applications library**, and **form_alert( )** as being supplied by the **forms library** inside GEM.

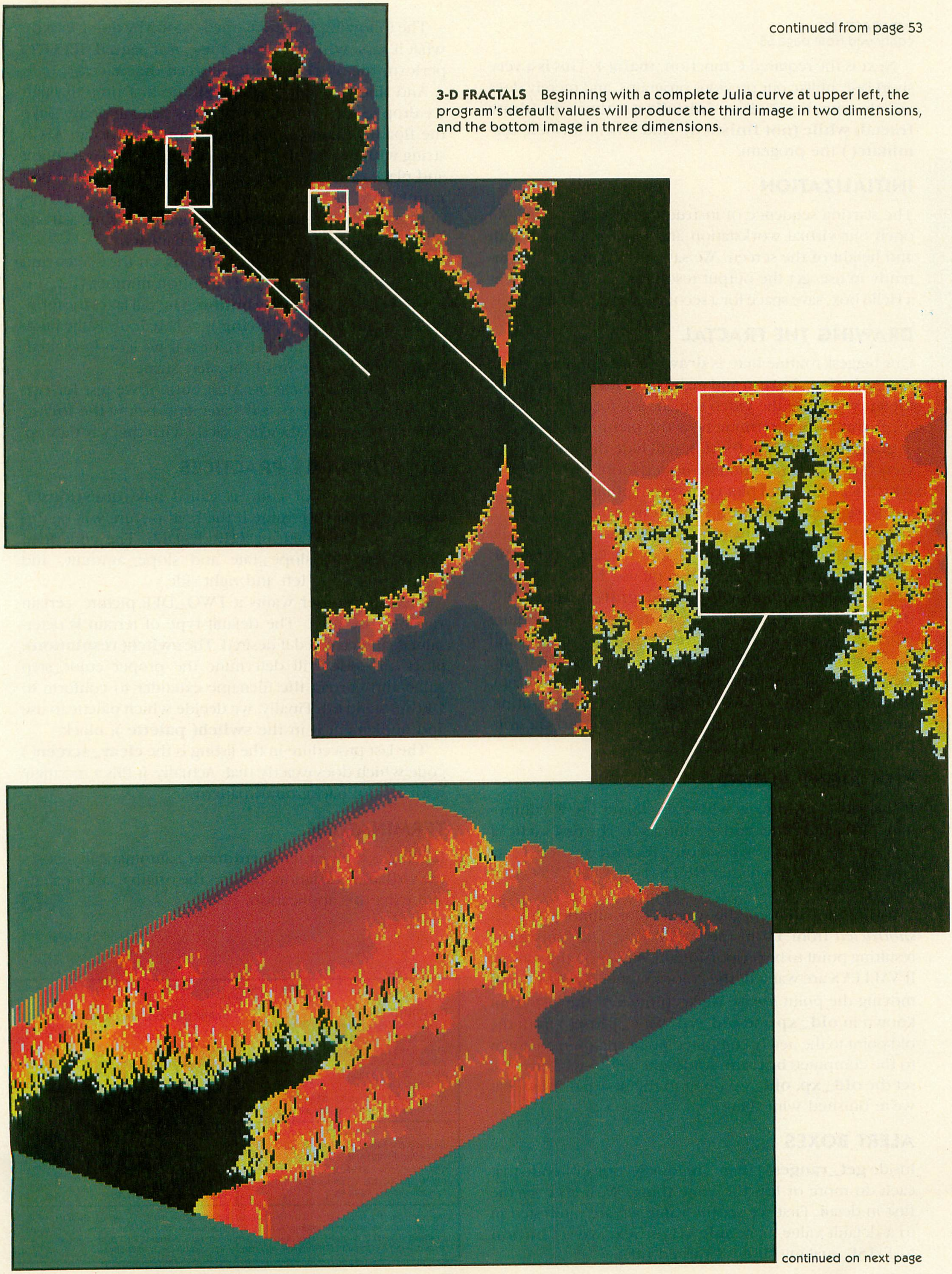
In most cases, a routine that begins with a capital letter followed by lower-case letters will be either a BIOS, BDOS, or XBIOS routine. But this is not always the case and depends on whether OSBIND.H has been included in the program.

C conventions require that **#defines** are written entirely in capital letters. So when you see an all-caps word, it has probably been defined elsewhere—either at the top of the code or in an included file.

Keep in mind that much of this is based on standards set by Alcyon C in the developer's toolkit. Other language developers may choose to alter these standards. But we hope not.—Patrick Bass


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continued from page 53



3-D FRACTALS Beginning with a complete Julia curve at upper left, the program's default values will produce the third image in two dimensions, and the bottom image in three dimensions.

continued on next page

3-D FRACTALS
continued from page 55

Next is the required C function, **main()**. This is a very short one, unlike our previous programs, and merely does exactly what it says. First, **initialize()**, then, **do (draw fractal) while (not finished)**. And when finished, **terminate()** the program.

INITIALIZATION

The starting sequence of instructions is found here. We open our virtual workstation and determine the width and height of the screen. We save the color palette currently in use, get the output resolution (0, 1, 2), present a Hello box, save space for a second screen and then leave.

DRAWING THE FRACTAL

Our biggest routine here is **draw_fractal()**. First it will save space for a **button** and make sure **finished = FALSE**, then it will erase the video screen, ask for the ranges of the picture and determine how the picture is displayed.

graf_mouse(256, 0x0L); will hide the mouse from view. Next we enter a double-nested loop, **yp** and **xp**, in which we figure and plot each fractal point in turn, from left to right and from top to bottom.

Again, the logarithm for figuring each point can be found Charles Jackson's introductory fractal article in this issue. **evnt_mouse()** tests the mouse buttons for an early exit if either button is pressed, **graf_mouse(257, 0x0L);** will cause the mouse to reappear. We inquire whether the user wishes to save the resulting image, and then test if the user wishes to draw another fractal. If not, we are finished, and fall out of this section back to **main()**. If the user wants to save the picture, the next routine, **save_it()**, does the job in DEGAS format and the routine comes to an end.

PLOT RIGHT ALONG

Inside **plot_point()** is where we figure the Z component offset and either add or subtract it. The first **switch(terrain)** statement sorts that out. **Terrain** is where I execute the choice of whether HILLS (1) or VALLEYS (2) are desired.

If HILLS are desired, the scaled color number (0-15) is *subtracted* from **YP** in the **XP,YP** pair. This causes the resulting point to be proportionally *higher* on the screen. If VALLEYS are wanted, the color number is *added*, thus moving the point *lower*. We keep track of the last point known in **old_xp** and **old_yp**. We **v_pline()** from the old point to the newly computed point and then go down to the computed **bottom**. And right before we leave, we set the **old_xp, old_yp** point to the new pair now that we're finished with them.

ALERT BOXES

Inside **get_ranges()** there are four sections of code that each do more or less the same thing. We'll go over the first in detail. First we set the value we are interested in to a default value, here **side=.11;**. Next we set **button** to FALSE, making sure it's turned off.

The following statement opens a loop by doing exactly what it says: **while (button does_not_equal SELECT)** perform the block of code between the braces.

And since the button is FALSE the first time through we drop to the next statement. This statement says: Take the floating-point number **side**, convert it to an ASCII string with five numbers to the right of the decimal point and place down the string starting at memory location **numbuff**. The next line transfers the first five characters of that number inside the matching **alert** string, starting with the alert string's twentieth character.

The line below puts the Alert box on the screen and waits for a user response. The button number (1,2,3) is returned to the user inside **button**. The call takes the form: **x=form_alert(icon, string);**, where **icon** is the number of the icon desired (1-3), or 0 if no icon is wanted. **string** is the location of the alert string.

After the user clicks an Alert button, we test for two of the values in the two **if** statements below the **form_alert()** line. Again, they do exactly what they say they do.

QUESTIONABLE PRACTICES

The next block of code is called **ask_questions()**, where we first determine if the final picture will be displayed in TWO_DEE or THREE_DEE. The code then determines the slope_rate and slope_amount, and figures the image left and right side.

Next, if the user wants a TWO_DEE picture, certain variables are reset. The default type of terrain is determined, and changed if desired. The **switch(resolution);** block of code will determine the proper color_step value and correct the filename extender to conform to DEGAS standard. Finally, we decide which palette to use and implement it in the **switch(palette);** block.

The last procedure in the listing is the **clear_screen()** code which does exactly that. Actually, it fills a rectangle with a solid background pattern.

TERMINATION

Leaving is even easier. **terminate()** automatically closes the virtual workstation, restores the original color palette and exits this application.

Listing on page 101

ST CARTRIDGES

How to program plug-ins

by PATRICK BASS, **Antic** ST Program Editor

If you own an Atari 520ST, you have probably noticed an opening towards the back of the left side that looks as if it might hold a program cartridge.

Well, that's what the opening is there for, pardner. And in this article we are going to discuss not only how the two types of ST cartridges differ—but also how the 520ST recognizes when a cartridge is there, and how to place your own code inside a cartridge so the ST will use it.

WHAT ARE CARTRIDGES?

These days, most programs are stored on disks. However, cartridge programs are stored in a type of memory chip that you can only read. And ROM (Read Only Memory) chips won't "forget" the program when power is shut off or the cartridge is removed.

Unlike programs stored in RAM, cartridge code can't be hurt or destroyed by accidentally writing to the memory area it lives in. Also, since the program on a cartridge doesn't have to load in from a disk, it is instantly available for use as soon as the computer is turned on. Cartridges are also considerably more rugged than disks. You don't have to worry quite so much about spilling coffee on them.

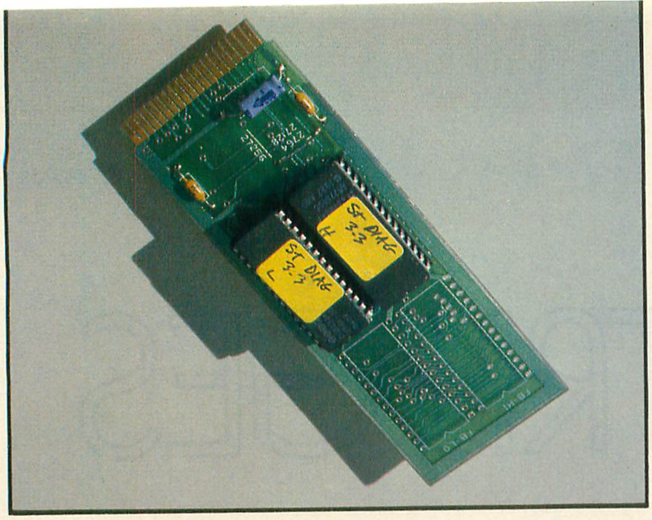
Cartridges for the Atari 8-bit computers normally store 8K to 16K programs—unless you use special tricks such as bank-selection. Atari ST Cartridges can be as large as 128K without any trickery. Cartridge address space in the 520ST is found in memory beginning at $FA0000 (16384000) and ending at $FBFFFF (16515071).

There are two types of cartridges for the 520ST, Diagnostic and Application. Application cartridges have everyday runnable programs stored on them, and there may be more than one application on each cart. Diagnostic cartridges, however, are a different breed and we shall examine them first.

Figure 1
Cartridge Application Header

($0) CA_NEXT	Next Header
($4) CA_INIT	Init code
($8) CA_RUN	Run code
($C) CA_TIME	DOS time
($E) CA_DATE	DOS date
($10) CA_SIZE	Size appl
($14) CA_NAME	Asciz name

continued on next page



DIAGNOSTICS

Whenever you turn on the power or press [RESET], the operating system inside the ST checks for a diagnostic cartridge before practically anything else is done. This allows the diagnostic cartridge to "take over" the entire system, if desired.

The ST can tell if a diagnostic cartridge is inserted when the first four bytes of the cartridge (found at $FA0000) contain the value $FA52235F. If these four bytes are found, the computer will transfer control to memory location $FA0004, where you should start placing your MC68000 machine language instructions.

Address register #6 (a6) will contain a return address if the cartridge ever wishes to return control to the regular operating system. The stack pointer will contain garbage. Most of the hardware registers will not have been touched, and RAM will not have been sized or cleared. The responsibility for initializing the memory controller is up to you.

APPLICATIONS

If the four bytes at $FA0000 are $ABCDEF42 the ST assumes that an application cartridge has been inserted, rather than a diagnostic cartridge. The ST attempts to read in the first "application header," which is found starting at $FA0004.

An application header contains information about the application(s) on the cartridge. (See *Figure 1.*) There can be as many applications on the cartridge as will fit into its ROM. But there must be one application header for each application.

The header is set up as follows: **CA_NEXT** is a long pointer to the next application's header, if any. If there are no more application headers on the cartridge, this value is $00000000. **CA_INIT** is the long pointer to the application's initialization code. Again, a value of $00000000 signals that no initialization is needed.

However, if there is initialization code, it is executed at startup time, as controlled by bits in the high byte of the **CA_INIT** longword. These high bits (24 . . . 31) are as follows:

Bit 0 (24)—If set, the initialization code is performed before the initialization of the interrupt vectors and display memory.

Bit 1 (25)—If set, cartridge initialization is performed before GEMDOS is initialized.

Bit 2 (26)—Unused.

Bit 3 (27)—If set, the initialization is performed just before a disk boot is performed. This may change in the ROMmed TOS.

Bit 4 (28)—Unused.

Bit 5 (29)—If set, the application is considered to be a desk accessory.

Bit 6 (30)—If set, the ST will treat the application as a TOS program, and it is assumed that no AES calls will be performed.

Bit 7 (31)—If set, the ST will treat the application as a "TOS-takes parameters" application.

CA_RUN is a long pointer to the application's main entry point. **CA_TIME** and **CA_DATE** are DOS-format time and date stamps for tracking when the cartridge was last updated. **CA_SIZE** is a longword which states the amount of bytes in the application, and **CA_NAME** is the DOS-acceptable filename of the application ending with a single zero byte. By DOS-acceptable, we mean a maximum of eight characters, a period, and a three-character extender.

ROLLING YOUR OWN

When you decide you want to create your own 520ST cartridge, you'll need two basic items. At this writing, one is widely available and the other isn't.

The first is an EPROM burner and EPROM memory chips. An EPROM burner will "burn" a new program into the EPROM chip, which will then remember the program (even without power) until it is erased. These chips may be used over and over.

The other thing you need is the small circuit board you plug the EPROM chips into and the plastic case that encloses the cartridge. Both these items are currently pretty rare birds. **Antic** has been unable to locate a manufacturer or distributor of these boards in the United States. In fact, it was all we could do to find just one board for our own use.

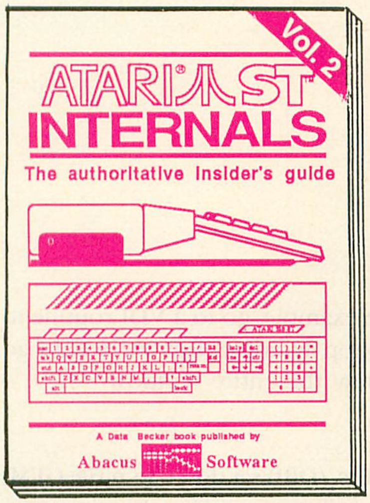
But after stalking the elusive quarry for some time, we discovered that Computer Support of South San Francisco (an authorized Atari repair center for Northern California) had a diagnostic cartridge. We snapped the photo you see here just to prove its existence.

EXIT STAGE LEFT

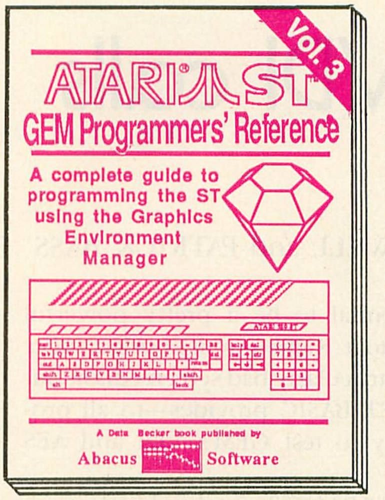
We have described here all the information you need to decode any existing cartridge, or create your own. Cartridges are probably the handiest and most durable form of program storage. But although they aren't as fragile as disks, they are more expensive to produce. This leaves the basic decision to you. As for me? Here come the bad guys, pass me the cartridges, Ma . . . the ST cartridges, that is.

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CONTROL GEM WITH ST BASIC

Part I: VDI calls

by JAMES LUCZAK
Article by JACK POWELL and PATRICK BASS

ST BASIC has the potential to be a pretty powerful language—if you can get to it. Right now, it's buried under several windows and a particularly bad screen editor. But one very handy thing ST BASIC provides—to all programmers—is a fast way to test GEM's VDI and AES routines.

Unfortunately, Atari's ST BASIC Sourcebook only mentions the GEM routines in passing and gives just a few examples of how to use them. There's a good reason for this. The entire VDI and AES system consists of over 200 calls. Pretty daunting. But we all have to start someplace, so let's get at it.

In this issue, we will show you most of the GEM VDI calls and how to access them from BASIC. Next month, we'll finish up any leftover VDI material. Although we will be displaying our examples for ST BASIC, with a little effort, programmers of any language should be able to use the information.

But before we get our hands dirty, lets take a look at what we're playing with.

GEM IN A NUTSHELL

We refer you to the **Antic** January 1986 ST Section, *TOS Roadmap* for greater details. Briefly, GEM—which stands for Graphics Environment Manager—is a software interface between the ST operating system and the user. GEM, in turn, is made up of two parts: VDI and AES.

AES, which is mnemonic for Application Environment Services, is made up of VDI elements. And VDI, meaning Virtual Device Interface, consists of some even smaller routines. But for our current purposes, we will consider VDI to be the smallest building blocks in GEM.

When we speak of building blocks, we are really talking about machine language routines in the ST operating system which may be pointed to for accomplishing certain tasks. We might, for example, go to a VDI routine to draw one line in a desktop window. But we would go to an AES routine to draw the entire window.

WHY GEM?

When Digital Research, Inc. (DRI) sat down to write GEM, they decided to write it so that any applications program written according to the GEM guidelines would run on *any other computer that also had GEM installed.*

Not an easy task. The way DRI solved the problem was to set GEM up as a "virtual" computer. They decided what the perfect computer—regardless of manufacture—should perform like. They choose the perfect resolution, how many colors could be displayed, what devices could be driven, how information is exchanged and so forth. The "software" computer they designed is GEM.

For each version of GEM—such as the 520ST or IBM PC—DRI programmed GEM to translate the commands for the virtual computer into commands that came as close as possible to the machine they had GEM running on. The result is that the same set of instructions should perform the same job on either the IBM PC or the 520ST.

So it turns out that when you think you're programming your 520ST using GEM calls, you're really programming some super software computer deep inside the 520ST, and GEM is translating the commands from GEM to 520ST specific.

VIRTUALLY THERE

As mentioned, GEM consists mostly of machine language routines—or subroutines. These routines are accessed from higher languages in a way very similar to machine language routines in BASIC. This implies we will need to pass information to GEM and get information back.

DRI has classified the information into five different

groups: **Contrl**, **Intin**, **Intout**, **Ptsin**, and **Ptsout**. All five of these groups are *arrays* which hold *integer* (16-bit) values. Each array is much like a blackboard. The user writes values—or instructions—to GEM, which then acts upon them. The blackboard also provides a place for GEM to reply.

Intin and **Intout** (Integers In, Integers Out) are arrays for input and output parameter passing. **Ptsin** and **Ptsout** (Points In, Points Out) are for passing and receiving point coordinates. **Contrl** provides a place for passing and receiving Control values, such as opcodes and identification numbers.

Each VDI and AES routine contains an identification number, or opcode. When you wish to use a particular routine, it must be identified by its opcode number which is always placed in the zeroth element of the **Contrl** array.

Beyond that, the elements of the input arrays will require certain information, depending upon that routine's function. And certain output array elements may or may not return values which also may or may not be used by the programmer.

For practical purposes, what you as a programmer need to know is the name of the routine, the identifying opcode (taken care of by link files in most C languages), what the routine does, what input parameters it expects and where to put them, plus what output parameters are returned and whether to use them.

BASIC AND C

We're going to concentrate on BASIC here, but we'll throw in some details for you C programmers. Although there are currently no published sources of information on VDI and AES (outside of the Atari Developer's Kit), we fully expect there will be some available by the time this article appears in print.

To see how the arrays are used, let's follow, in BASIC, a VDI routine which is called **v_pline** in C. **v_pline**, which stands for VDI Polyline, has an identifying opcode of 6 and is used to draw one or more lines between points.

We're going to draw a diagonal line from X,Y coordinates 0,0 to X,Y coordinates 100,100.

In BASIC, **v_pline** takes the form:

BASIC code	**What it does**
10 poke contrl,6	v_pline OPCODE number.
20 poke contrl+2,num	num is the number of points to plot.
30 poke contrl+6,0	should always be zero.
40 poke ptsin,0	X-coordinate of first point.
50 poke ptsin+2,0	Y-coordinate of first point.
60 poke ptsin+4,100	X-coordinate of second point.
70 poke ptsin+6,100	Y-coordinate of second point.
80 vdisys(1)	Transfers control to GEM VDI

BASIC thinks in 8-bit bytes, and the GEM arrays are set up as 16-bit integers. Therefore, when POKEing VDI instructions in BASIC, we need to double each register number to point to the proper location to poke.

For contrast, let's look at a C listing for the same call. In C, you must also open a workstation before you can use any of the GEM system calls. We're not showing this here, but you will see it in any C listing in **Antic**. Look for the **v_opnvwk()** call.

In C, we put our instructions in the elements of an integer array, then place the entire array within the parentheses of the VDI call. Since the opcode number for the call is taken care of in a separately linked file, we used a pre-established label to identify the call. Alcyon C and its DRI developers' documentation have chosen the name **v_pline** in this case (which stands for VDI Polyline). **Antic** hopes these labels will remain standard, though some language developers may (shudder) choose to rename them.

Our **v_pline** call in C is:

```
int        points[4];        declare our points array.
  points[0]=0;
  points[1]=0;
  points[2]=100;
  points[3]=100;
  v_pline( handle, 2, points );
```

THE VDI CALLS

We have arranged the VDI functions in four groups—Polymarkers, Polylines, Text, and Graphics.

Polymarkers are routines which plot one or more single points of a chosen shape to the screen. Polyline routines draw one or more lines to the screen. **v_pline()** is a polyline. The text routines manipulate text in a variety of ways. Graphics is a catch-all category of routines not covered in the first three categories.

Each of the functions, as listed, contains the name of the routine, the necessary BASIC code to set up the parameters, and a description of what the routine does. Many of the functions also have a list of attributes that will modify the action of the routine. You may also see notes referring you to related VDI calls.

Let's take a look at our familiar **v_pline** call. You'll find it in the polylines subgroup under the title "Polyline." The BASIC pokes are in the left column and their description is in the right. C programmers can identify the routine from its opcode number in Line 1.

The description gives you some idea of what polyline will do. The list of attributes tells you that you may adjust, among other things, the polyline's color, the type of line it is drawn with, that line's width, and so on. Looking elsewhere in the polyline section, you will find VDI calls—such as "Set Polyline Line Type"—that will adjust these attributes. On the bottom of the polyline description is a note pointing you to "Extended Inquire" for related information.

continued on next page

CONTROL GEM
continued from page 61

THE DEMONSTRATION

Listing 1 is an ST BASIC program that demonstrates some VDI routines. Type it in and SAVE a copy before you RUN it. (No, we don't have a TYPO II for ST BASIC yet.)

We are going to draw a rounded and filled rectangle, then draw a trapezoid polyline within it, using a thickened line. Next, we will randomly place 100 multi-colored and shaped polymarkers on the screen. Finally, we alter the text output to skewed, underlined and green, and print a message to the screen.

In lines 1060 to 1180 we initialize some variables—mostly setting them up as reminders of their functions. But, in line 1060, the **pxy** array must be dimensioned since more than 10 array elements are going to be used in our program.

We briefly check for resolution in lines 1210 to 1240, then on to the main portion of our program.

Without going into line-by-line detail, you can see that we've placed the various VDI calls in labeled subroutines in the last two-thirds of the listing. (Our labels are the same as those used by Alcyon C, with the exception that there are no underline characters.) You might try collecting all your VDI calls in subroutine files which later can be used in any program you write.

The rounded rectangle is created in lines 1330 to 1380. Since we are going to do a filled rectangle, we first choose the fill color, then choose the fill interior style, and finally the index into that fill style. You can find the fill pattern styles and indexes in your ST BASIC Sourcebook.

Having set up our rectangle, we work out the proper X,Y coordinates for its upper-left and lower-right corners and then go off and actually draw the box.

In lines 1420 to 1550, we use the polyline routine to draw an odd-shaped box with thick, red lines. (Those with monochrome monitors will find that any color value that is not zero will be black.) Notice that although there are only four corners to our polyline, we have five vertices (or X,Y points) because we must include both the beginning and ending points in our array.

Lines 1580 to 1770 place various polymarkers in random places on the screen. Then, in lines 1810 to 1880, we print skewed, underlined, green text on the screen. Note that we go to subroutine VSWRMODE to adjust the write mode of the text to transparent, so it won't look blocky if printed over a polymarker.

At the end of the program, we set our text effects back to normal, close our window and leave. It's always good programming practice to leave your work area the way you found it.

Listing on page 106

POLYMARKERS

POLYMARKER

BASIC CODE	DESCRIPTION
1 poke contrl,7	OPCODE
2 poke contrl+2,num	NUM=Number of markers
3 poke contrl+6,0	
4 poke ptsin,x	X=Coordinate of first marker
5 poke ptsin+2,y	Y=Coordinate of first marker
6 vdisys(1)	

A POLYMARKER plots a point expressed by it's X and Y coordinates. More than one point can be plotted at the same time. Enter the number of points to be plotted in LINE 2 (num), then give the X and Y coordinates for each point as in LINES 4 and 5. Increase the offset for PTSIN by 2 for each additional X and Y coordinate pair. For example, to plot 2 separate points, follow the above code. In LINE 2 give the variable num a value of 2 (for 2 points). Add LINES 6 and 7 as follows. LINE 6 poke ptsin+4,x1 LINE 7 poke ptsin+6,y1.

ATTRIBUTES:

Color
Scale
Type
Writing Mode

NOTE: See EXTENDED INQUIRE for maximum number of POLYMARKERS.

SET POLYMARKER COLOR INDEX

BASIC CODE	DESCRIPTION
1 poke contrl,20	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,1	
4 poke intin,x	X=Color Index (See COLOR INDEX)
5 vdisys(1)	

SET POLYMARKER HEIGHT

BASIC CODE	DESCRIPTION
1 poke contrl,19	OPCODE
2 poke contrl+2,1	
3 poke contrl+6,0	

continued on page 64

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CONTROL GEM
continued from page 62

BASIC CODE	DESCRIPTION
4 poke ptsin,0	
5 poke ptsin+2,y	Y=Height in vertical units 1-199 for LOW & MED 1-399 for HIGH
6 vdisys(1)	

NOTE: You cannot set the HEIGHT of POLYMARKER TYPE 1
(See set polymarker type)

SET POLYMARKER TYPE

BASIC CODE	DESCRIPTION
1 poke contrl,18	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,1	
4 poke intin,x	X=Polymarker type 1=Dot 2=Plus 3=Asterisk 4=Square 5=Diagonal Cross 6=Diamond
5 vdisys(1)	

NOTE: If the marker type is out of range TYPE 3 is automatically selected.

INQUIRE CURRENT POLYMARKER ATTRIBUTES

BASIC CODE	DESCRIPTION
1 poke contrl,36	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,0	
4 vdisys(1)	
5 a=peek(intout)	Polymarker Type
6 b=peek(intout+2)	Polymarker Color Index
7 c=peek(intout+4)	Writing Mode
8 d=peek(ptsout)	Polymarker Width
9 e=peek(ptsout+2)	Polymarker Height
10 vdisys(1)	

NOTE: You need only PEEK at the attributes that are of interest to you.

COLOR INDEX

COLOR INDEX	COLOR	PIXEL VALUE
0	White	0
1	Black	15
2	Red	1
3	Green	2
4	Blue	4
5	Cyan	6
6	Yellow	3
7	Magenta	5
8	Low White	7
9	Grey	8
10	Light Red	9
11	Light Green	10
12	Light Blue	12
13	Light Cyan	14
14	Light Yellow	11
15	Light Magenta	13

POLYLINES

POLYLINE

BASIC CODE	DESCRIPTION
1 poke contrl,6	OPCODE
2 poke contrl+2,num	NUM=Number of X & Y pairs in the polyline.
3 poke contrl+6,0	
4 poke ptsin,x	X=Coordinate of first point in polyline.
5 poke ptsin+2,y	Y=Coordinate of first point in polyline
6 poke ptsin+4,x1	X1=Coordinate of second point in polyline.
7 poke ptsin+6,y1	Y1=Coordinate of second point in polyline.
8 vdisys(1)	

The POLYLINE function draws a line from one point expressed by it's X and Y coordinates to another point expressed by it's X and Y coordinates. The variable num in LINE 2 must have a miminum value of 2. You can draw more than one line by giving the appropriate X and Y coordinate pairs.

ATTRIBUTES:

Color
Line Type
Line Width
End Style
Writing Mode

NOTE: See EXTENDED INQUIRE for maximum number of POLYLINES.

SET POLYLINE COLOR INDEX

BASIC CODE	DESCRIPTION
1 poke contrl,17	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,1	

4 poke intin,x	X=Color Index (See COLOR INDEX)
5 vdisys(1)	

SET POLYLINE END STYLE

BASIC CODE	DESCRIPTION
1 poke contrl,108	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,2	
4 poke intin,x	End style for begining point of polyline
5 poke intin+2,x	End style for ending point of polyline 0=Squared (DEFAULT) 1=Arrow 2=Rounded
6 vdisys(1)	

SET POLYLINE LINE TYPE

BASIC CODE	DESCRIPTION
1 poke contrl,15	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,1	
4 poke intin,x	
	LINE STYLE 1=Solid 2=Long Dash 3=Dot 4=Dash,Dot 5=Dash 6=Dash,Dot,Dot 7=User Defined
5 vdisys(1)	

SET USER DEFINED LINE TYPE PATTERN

BASIC CODE	DECRIPTION
1 poke contrl.113	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,1	
4 poke intin,x	Line style pattern word
5 vdisys(1)	

The most significant Bit of the LINE STYLE PATTERN WORD is the first pixel in the line. For example a DASHED line style pattern word:
BINARY : 1111111100000000
DECIMAL: 65280

SET POLYLINE LINE WIDTH

BASIC CODE	DESCRIPTION
1 poke contrl,16	OPCODE
2 poke contrl+2,1	
3 poke contrl+6,0	
4 poke ptsin,x	X=Line width in horizontal units
5 poke ptsin+2,0	
6 vdisys(1)	

NOTE: Line widths are expressed in ODD NUMBERS. Default is 1. (1 pixel wide).

INQUIRE CURRENT POLYLINE ATTRIBUTES

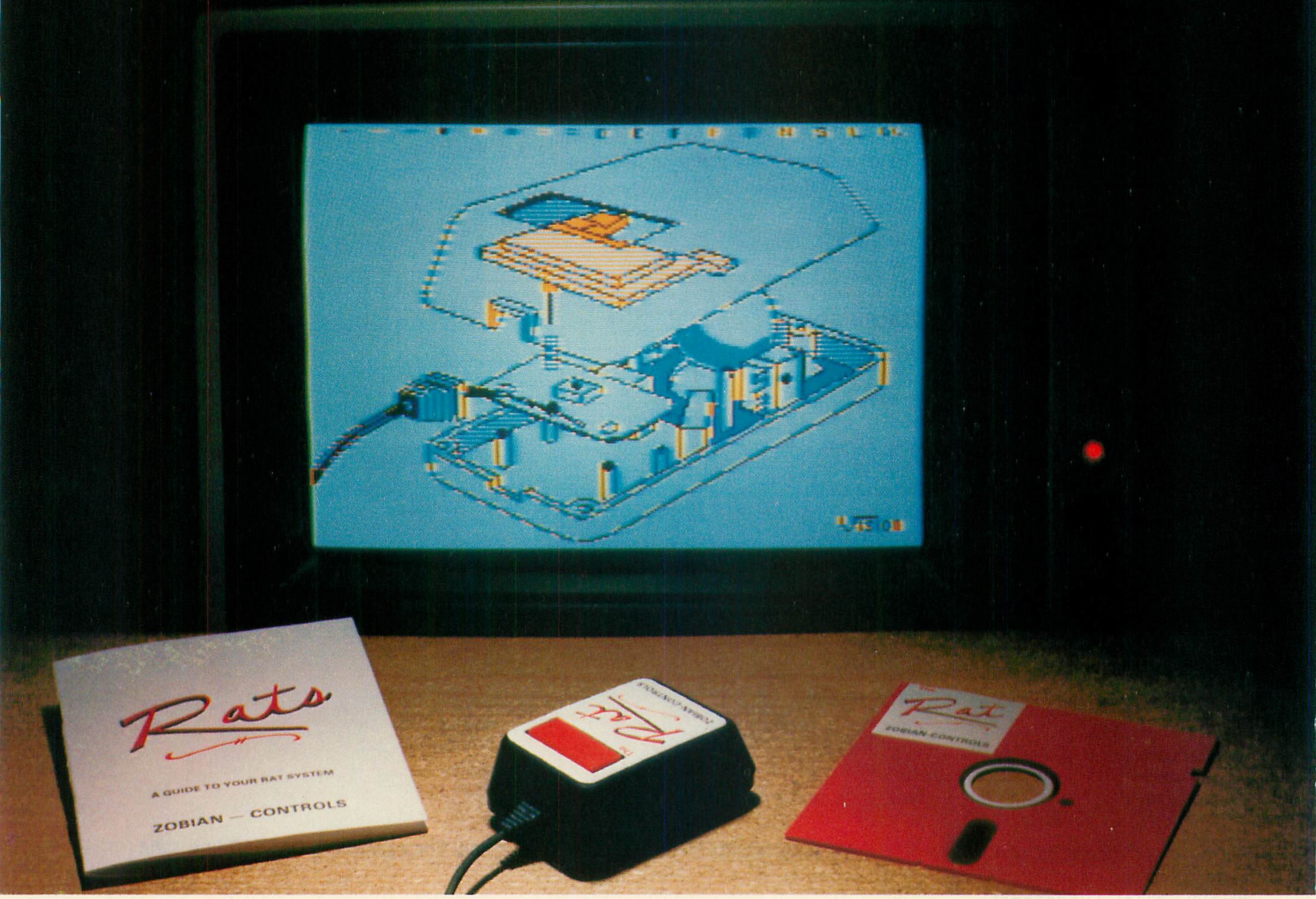
BASIC CODE	DESCRIPTION
1 poke contrl,35	OPCODE
2 poke contrl+2,0	
3 poke contrl+6,0	
4 vdisys(1)	
5 a=peek(intout)	Polyline Type
6 b=peek(intout+2)	Polyline Color Index
7 c=peek(intout+4)	Writing Mode
8 d=peek(intout+6)	End style for begining point of polyline
9 e=peek(intout+8)	End style for ending point of polyline
10 f=peek(ptsout)	Line Width
11 vdisys(1)	

NOTE: You need only PEEK at the attributes that are of interest to you.

(VDI listings will be continued next month.)

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THE FINAL WORD

...doesn't live up to its name

Reviewed by IAN CHADWICK

My first rule of thumb when evaluating a word processing program is—can I use the program itself to write the review? This means: Can I learn the program in a short time, does it resemble anything else I'm used to, is it free from serious programming flaws so it won't crash in mid-write and does it do an adequate job? I'm writing this review with **The Final Word**, so it satisfies my minimum requirements at least.

Final Word is actually a grandchild of EMACS, a mainframe text editor created at MIT. ST developers using Micro-EMACS will recognize the style and much of the command interface. Better yet, Final Word is closely patterned after Perfect Writer, another EMACS descendant and a program I've been using on a Kaypro computer for several years.

Final Word can legitimately be called a document processor. It features many powerful commands to manipulate the format of professional documents such as books, contracts, manuals, theses etc.

This software can produce multiple section headings (numbered), indexing, table of contents, intricate formatting and display, variable heading and footing commands, multiple indentation levels, form letter creation, appendices, enumeration and itemization, footnotes, multiple print and display environments, and much more. And the price for this wealth of features is an accompanying increase in complexity and learning time.

As a clone of Perfect Writer, Final Word shares its strengths and weaknesses. First, it's a command driven program. The software is translated almost verbatim from its IBM version. The package tries to rationalize the lack of a GEM interface by saying, "The great debate about whether it is more or less efficient to do word processing tasks with a rolling rodent is not yet over.".

I've done serious writing with both mouse and command styles of word processor and I feel it's a matter of taste. However, the GEM interface uncontestably makes things easier and involves less memorization. Many features of Final Word could have been incorporated into drop-down menus without the slightest loss of efficiency. This would have enhanced the program and overcome the multiple keystrokes required for some commands. If GEM was a deciding factor for buying your 520ST, you won't like Final Word at all.

Most screen oriented commands are driven by a combination of [CONTROL] key or Function key presses. For example, [CONTROL] [F] and [CONTROL] [R] (or an arrow key) set the direction of movement, or display commands to forward or reverse. Then [CONTROL] [V] moves the dis-

play one screen in that direction.

Although I'm accustomed to using this kind of word processor, many people might consider Final Word to be a dinosaur compared to today's mouse-controlled or menu-controlled word processors. The command structure isn't difficult, but it is not mnemonic and is often awkward.

For example, although you can get a list of buffers, you have to remember their names in order to delete them rather than pointing to one with a mouse or a cursor. Also, this process—as well as many others—requires two steps when one should suffice. It is not an intuitive system.

Format commands such as headers, footers, line spacing, and so on must be marked in the text with a "@" sign and enclosing fences such as curly braces or parentheses.

Marking a word this way: @b(bold) will cause **bold** to be printed in boldface. @i is for italics, @u is one method of underlining. Chapters, sections, subsections, paragraphs, appendices and appendix sections are numbered at print time, and a table of contents is automatically generated at the end of the document.

Enclosing a word with @index and fences will put it into an index, also printed at the end. Numbered footnotes can be generated within the text, at the bottom of a page or at the end of a chapter. Although you can center and justify text and set flush right or left margins for any line onscreen, you don't see the effect of most format commands until print time.

Surprisingly, there is no indication of end-of-page such as provided in WordStar, Word Perfect or even HabaWriter. You can get a line count, but no visible mark to locate page breaks. This little feature is sorely needed. You can force the program to jump a page break over a given space so graphs and charts are divided onto two pages, but it's still nice to be able to recognize the page end by sight.

There are two printer commands. One prints out the text exactly as seen on the screen without numbering, typefaces or the like. The other is the advanced "format" feature which incorporates all the @ command formatting features. The latter can also format your text for devices other than the configured printer—say for printing to disk.

One of the strengths of Final Word is its ability to open and maintain multiple buffers—each with a separate document or text. Up to 12 can be opened at once, but the program uses one for disk directories, another for "kill" text (which can be recalled with the [UNDO] key at the cursor location) and one for the Help file.

You can switch between buffers, moving text between them easily. I always maintain a "notes" buffer when I write, to jot down thoughts for later use or editing. You can also open two windows on screen, each showing a different buffer, and move between them. Not as elegant as the GEM windows, this is nonetheless a major advantage over other non-GEM word processors like ST Writer.

To gain memory for the multiple-document buffers, Final Word uses a virtual memory technique. It keeps a "swap" file on disk and frequently goes to it, swapping onscreen text with the disk file to keep in memory only the current buffer and to update the disk file with changes and additions.

A RAMdisk is almost essential to keep this frequent swapping from being annoying. The maximum size of the swap file is limited by disk space and must be created in eight-page increments (a 96 "page" file is roughly 100K which translates to about half that in single-spaced, printed pages).

The maximum document size I was able to load before getting told that my 96-page swap file was full was only about 48K. The program also fails to recognize my additional 512K upgrade, a serious drawback for the writer who may want a larger file in memory at once. The 512K upgrade ought to preclude a swap file altogether but it doesn't. Final Word holds less text than ST Writer in a single file. Also, the disk with the swap file MUST be kept in the drive and not removed, or the program crashes and you lose your text not currently saved. A recover program usually repairs your swap file, but it's a pain.

When you load the program, the previous contents of the swap file are brought into memory and shown on screen. Not always a desired occurence. If you were working with multiple buffers, you have to delete them now, or remember to do so at the end of a writing session. Otherwise, they're all recalled. This is sloppy programming. The swap file should appear empty when the program is loaded and avoid this nonsense.

Also, I found you can't delete the kill buffer or the directory buffer once you call for a disk directory! In order to get a directory of a new disk in the same drive, you must do a directory of the *other* drive first, then the second drive. Otherwise it retains the directory in a buffer and can't be coerced into forgetting it!

The translation from IBM PC to Atari ST was less than perfect, despite the company's claim to have created "crash-proof" software. For example, any attempt at highlighting will generate the alternate character set onto the screen—a jumble of mathematical symbols, Greek and international letters.

Final Word's Documentation is impressive—but not particularly good. You get a big, IBM-style box, three-ring binder and new-smelling, glossy paper. A large tutorial and a larger reference guide provide the answers to almost any questions you can imagine, with only a few oversights. Unfortunately you often have to dig deeper than you should to get an answer to a simple question.

Because this word processor demands more effort than most, care should be given to reading the manual before trying out more advanced options such as output device configuration and altering the default installation mode. But since the documentation was originally designed for the PC, it is less than complete when dealing with the ST. What files are required on your disks and what

continued on next page

parameters must be entered when loading are just two of the items missing. Much of the manual is barely adequate for ST users and sometimes requires experimentation to discover what's required.

Considerable wordage describes numerous IBM PC keys which aren't available on the ST, then neglects others which the ST sports. Also, several features don't seem to work—such as the menu item "capitalization." And the Help feature is given no commentary at all. Worse, there is not enough room in the command line to include all the characters of disk ID, folder (path) name and filename, so wild cards are a necessary, though not always viable, solution.

Final Word uses separate format and print programs which can be run from the desktop (as TOS-takes-parameters files—poorly documented but understood with a little tinkering) or from within the editor. This is unlike most other all-in-one programs. But it allows greater flexibility for output, although there is not a subsequent gain in memory as would be expected.

The program is protected, with which I have no disagreement, but one of the original disks is needed to validate and run a copied file. No mention is made of purchasing extra "originals" from the company. This would be better than carrying around an original in case of an accident.

Also, if there's a problem with the swap file, you must load the program, exchange the backup disk with an original, then insert the program disk again only to be told there is a problem and be deposited back at the desktop. It would have been friendlier if it checked the swap file before it bothered checking for the protection scheme!

Final Word is a lot of work but will ultimately prove an excellent (if currently flawed) tool for the serious writer. However, the name is overly pretentious for the quality you get. And, once again, Mark of the Unicorn has pasted a hefty price-tag on their software. As it stands, Final Word (version 1.17) needs to be more thoroughly debugged. The documentation should be re-written for the ST, and the buffer management re-programmed. When all this is done, I will recommend Final Word to anyone who wishes to write in a "document" environment or to any professional writer. Until then, I'd continue to use ST Writer if I were you.

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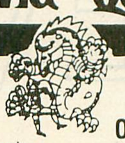
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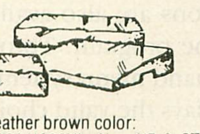
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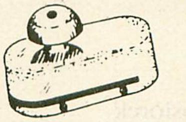
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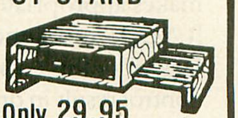
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ST PRODUCT NEWS

ST reviews

ST-TERM
Commnet Systems
7348 Green Oak Terrace
Lanham, MD 20706
(301) 552-2517
$39.95

Reviewed by John Kosiorek

ST-TERM software provides a host of useful features for 520ST telecommunications, including three popular file transfer methods and fully controllable RS-232 settings. At $39.95, ST-TERM is a good value—particularly when used with a Hayes-compatible modem.

ST-TERM offers VT52 terminal emulation in a program with similarities to the design and flow of AMODEM for the 8-bit Atari. This program makes appropriate use of the [HELP], [UNDO] and Function keys, but the lack of color, GEM icons and mouse control result in drab-looking screens.

The documentation consists of 20 well-organized pages. Among ST-TERM's features are full control of the RS-232 configuration including host remote echoing and six baud rates from 300 to 9600, 16K buffer for toggled capture, printer logging and three file transfer protocols. Files can be transferred by Kermit; XMODEM with unlimited file size; in standard and AMODEM dialects; or ASCII format with user control of delays between characters and lines, and optional line prompting.

In addition, ST-TERM utilizes files for initial RS-232 settings, defining macro function keys and—for Hayes compatible modems—a 400-entry autodialer with the ability to re-configure the RS-232 port.

Each autodialer entry has fields for name, number, baud, data bits, stop bits, parity, password, account number and comments. Fields are provided for timers and billing rates—which are to be utilized in upcoming version 2.0. TOS disk functions are also available from within the program. Throughout the command menu system, each screen displays the valid choices. After you become familiar with the commands, you can enter most of them without going to the main menu.

ST-TERM is installed as a TOS-Takes Parameter application. When loading the program, a setup file can be entered to set the initial values for the macros and the RS-232 port.

When the program is running in terminal mode, pressing the [HELP] key displays the main menu from which all commands can be entered, either as a direct command or through a series of secondary menus.

For example, if you type [A] at the main menu the first 10 entries of the [A]utodial directory are displayed. At this point you can edit any of those entries, page through the directory, or select a number to dial.

The account number and password of an autodialed entry are transmitted once a connection is made. When a number is autodialed, the RS-232 port is re-configured to that entry's specifications. Through the use of the autodialer and macros, only four keystrokes can sign you off a 7-bit, even parity, 300 baud CompuServe session and connect you to an 8-bit, no parity, 1200 baud BBS.

Utilizing the 10 Function keys along with the [ALTERNATE] key, ST-TERM provides 20 macros storing as many as 60 characters each. The macros are stored in setup files. By loading a different setup file, macro sets could be customized for different terminal sessions.

While there are no GEM interface bells-and-whistles, many little touches make the program enjoyable to use. For example, all file transfers start transmission with an [ALTERNATE]

[T] key entry. All editing is accomplished with the same keys, regardless of the data being entered—macros, autodialer or disk functions. If you accidentally press the [UNDO] key—which will exit the program—you are asked, "Exit, Are you sure?". This is certainly one appropriate time for the much overused confirmation request.

The manual warns against selecting any printer function when a printer is not online. The ST's operating system waits for the printer to respond and the result is computer lock-up. *(Actually, there is a BIOS call that will check for device availability. The software, not the computer, is at fault here for not checking to see if the printer is there.*—ANTIC ED)

The 520ST is a very powerful computer. It would be nice to have modem software that takes advantage of more of its features. ST-TERM version 2.0 promises various improvements that are not currently included—such as connect timers and a billing calculator.

Also, having an autodialer with 400 entries almost requires some form of automated search capability beyond the current method that merely displays 10 entries at a time. In addition, the main menu or a status screen could display all the current RS-232 settings and translation modes, making it easy to scan this data if things aren't going right.

The ST-TERM disk is copy-protected but Commnet Systems will provide a backup disk for $10.

TRANSYLVANIA,
CRIMSON CROWN
Polarware/Penguin Software
P.O. Box 311
Geneva, IL 60134
(312) 232-1984
$34.95 each

Reviewed by Mike Fleischmann

In **Transylvania** you are a brave traveler journeying to Transylvania to search for the king's daughter who disappeared under mysterious circumstances. You receive a letter from King John (in your program documentation) asking for your help, as well as a business card from Zin the Wizard and a page from the local newspaper.

Beginning your trek at an ancient stump, you are almost immediately confronted by the land's monstrous inhabitants. There are bats, floating figures, voices from nowhere, strange forces, witches—and an annoying werewolf that incessantly hounds you (excuse the pun) until you find a way to dispose of it.

Now, in **The Crimson Crown (Further Adventures in Transylvania)** you are once again a bold adventurer. But this time the king has died and the evil vampire has taken his magic crown. You must somehow find the crown and get it back before the vampire learns of its magical powers and bends them to his will.

In this adventure you have two traveling companions, Eric the Crown Prince and the Princess Sabrina. Each has a definite role to play in the adventure, but it is up to you to find out what those roles are and to use them to succeed in your quest.

Included with your disk is a full color poster, a map of the countryside, a journal, and a sealed parchment. Do not open the parchment! In the game there are definite instructions for what to do with the parchment and you lose some of the fun when you peek early.

You start the game on the shore of a lake, but soon fall into a trap. It seems as if the entire land is out to get you!

You will also see some old familiar places and animals from the earlier Transylvania adventure. I found that this gave Crimson Crown a nice feeling of continuity. But you don't need to have played the previous adventure to enjoy this one.

Crimson Crown is a riddler's delight. At least four major riddles need to be solved. Also, during your journeys you will occasionally come across a hooded sage who gives you cryptic hints—more riddles, of course—about how to solve the adventure.

Of the two adventures, I would rate Transylvania as easy-to-medium. Crimson Crown is definitely

continued on next page

harder—especially if you have trouble with riddles, as I do.

The graphics are good in both programs but Crimson Crown's screens are somewhat superior. Nevertheless, both adventures contain colorful, atmospheric and well-detailed pictures. In one screen, there is even a small spider on a web that is clear and distinct.

Both Transylvania and Crimson Crown use an interpretive parser called "Comprehend" which allows use of full sentence commands and has a vocabulary of over 1,000 words. I found Comprehend easy to use. It understood what I wanted to do about 80 percent of the time—which meant that I wasted very little time rephrasing my instructions so the programs could understand them.

The adventures are not without their flaws. The worst is probably the text scroll. When there is enough text to fill the area at the bottom of the screen, the program waits for you to press the mouse button or a key. I often found myself typing in commands twice.

Also, if you try to type while the text is being put on the screen, the type-ahead buffer captures only a few characters randomly. This annoyed me at first, but I soon adapted and the problem became only a minor inconvenience. In all fairness, when running the programs in text mode, covering ground you are familiar with, you don't experience this problem.

Crimson Crown has a few logic flaws. As an example, I had been trying to get some flies to feed a hungry frog. In a cellar, when I felt the ceiling, I had bugs raining down on me, but I couldn't get any to feed the frog with.

The programs let you save as many as four games on the game disk, so you don't have to constantly switch disks. Also the company is supportive. You can get a free book of hints just by writing in.

Overall I think these two programs are worth the money and quite enjoyable to play. Even my wife (who is no adventure fan) liked the pictures and enjoyed the text.

DEGAS Art Competition

You can enter until March 31

You still have a chance to win some of the $2,000 worth of cash and software prizes in the **DEGAS** Art Competition, sponsored by Batteries Included and judged by **Antic** magazine. Create an Atari 520ST picture with BI's powerful new DEGAS paint program, reviewed in the February 1986 **Antic**.

There are two grand prizes of $500 cash—one each for the best color and best monochrome picture. Five runner-ups receive a selection of ST software from the Antic Catalog and BI, plus one-year subscriptions to **Antic** Magazine.

Entries must be received by March 31, 1986 at **Antic**, 524 Second St., San Francisco, CA 94107. Only registered owners of DEGAS software may enter the DEGAS Art Competition. Complete rules can be found inside specially-marked DEGAS software packages, along with the official entry form which must accompany each disk entered in the competition.

WORD FOR WORD
Bay View Software
177 Webster Street, A-295
Monterey, CA 93940
(408) 373-4011
$39.95

Reviewed by Sol Guber

Why buy a computer Scrabble game? Well, it's fun to test your wits and vocabulary against the 520ST. And maybe you have trouble finding opponents at your own level.

Word for Word is a Scrabble-type game that even lets you design your own boards. It is almost completely mouse-driven and can be played by as many as four people simultaneously. Or the ST can take on three human opponents—at three different levels.

The board used for the game can be a normal Scrabble board with squares that double or triple the value of letters or words. There are also bonus squares that increase the value of a letter by a fixed amount.

The computer plays at three levels—beginner, intermediate, and advanced. And it thinks "out loud." You can see the words and their placement on the board as the ST considers its move. At the beginner level, the software plays a mediocre game and can easily be beaten. (*Note: this is the reviewer's opinion. We didn't find the beginners level all that easy!*—ANTIC ED) At the intermediate level, the computer plays well. At the advanced level, the fun really starts.

Word for Word can help increase your vocabulary. You can let the computer suggest words for you, using your letters. This will teach you some new (and often arcane) words.

Another vocabulary booster is based upon the rule of Scrabble that lets you challenge your opponent as to the validity of his words. This option is built into Word for Word. The computer can challenge one of your words and vice versa. The computer has a 50K dictionary built into the system. However, it cheats! Every so of-

continued on page 76

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ten in the advanced version, it will throw in a bogus word. I do not feel that this is an error on the part of the programmer, but a feature to keep human players on their toes.

You can, of course, also use made up words and when the computer challenges the word, explain that you have looked up the word in a dictionary. You do this by clicking the CORRECT box. But it takes a mighty low person to cheat a trusting 520ST.

It's easy to use the mouse to design and save your own board layout and your own letter values and frequencies. This feature makes the game even more fun.

For example, I always thought it was unfair to have only one high-value X. And now I regularly play with 12 Xs. This makes for a much higher-scoring game. Or you can increase the amount of letters taken by each player per turn. Add more blank tiles, lots of triple word squares and higher values for exotic letters—the whole character of the game is changed.

Word for Word uses drop-down menus for commands, so the clear and complete manual is not really needed at all. The play is quick and exciting and uses the capabilities of the 520ST very well. The mouse is used to good advantage both in manipulating the letters and pointing to the spot where they should go. When there are more than one human players, you can hide your words from the other person when you take your turn.

My only complaint is that Word for Word came from an IBM PC version, and there is not a word in the manual about the ST. Otherwise, this is a good, solid version of a board classic.

A MIND FOREVER VOYAGING

Infocom
125 Cambridge Park Drive
Cambridge, MA 02140
(617) 492-6000
$44.95

Reviewed by Harvey Bernstein

As any longtime reader of **Antic** probably knows by now, I have been an avid Infocom text-adventure freak ever since I bought my Atari 810 disk drive and Zork I on the same day. Thus it was with great anticipation that I greeted **A Mind Forever Voyaging**—Infocom's first 128K-minimum game and its first original release for the ST. Written by the venerated Steve Meretzky, whose previous credits include Planetfall, AMFV is the most original game to come out of the Infocom stables in ages.

The game begins in the year 2031, when you make the shocking discovery that your life and memories until now are just electronically implanted delusions—that you are actually a sophisticated computer known as PRISM! The reason for revealing your true origin is somewhat sinister. Society is on the verge of collapse, so the ruling powers have instituted the Plan—a complex series of socio-political steps designed to put civilization back on the right course. Your job is to enter a series of simulations—10, 20, 30 years into the future—in order to test the long-term effects of the Plan. But what is the Plan, and who is really behind it? Is the Plan truly a boon to mankind, or does it need to be stopped? And if so, how can it be stopped? Answering these questions becomes the ultimate goal of A Mind Forever Voyaging.

As expected, AMFV makes no use of the GEM interface and contains the usual Inocom parser, only larger. Command structure is actually two-fold. In the early parts of the game, you cannot move or pick up objects—don't forget, you are a computer. Instead you can enter different "modes," allowing you to tie into a worldwide news service, communicate with human beings, review your own message banks, or even interface with other terminals. In this manner, AMFV is very much like Suspended. Once inside the simulations, however, it becomes a standard adventure.

AMFV is considerably more open-ended than your average text adventure. You can wander almost anywhere, and you don't get killed (at least not that I've discovered). The bad news is that this game continues the trend started with Cutthroats and

Hitchiker's Guide—if you don't do the right thing at the right time, everything comes to a standstill. Oh, you can walk around, all right, but nothing happens to advance the story and the other characters can't be found. At least with a locked door you have some idea of what to try next.

The expanded memory of the ST allows for one of the nicest upgrades of the Infocom parser—the "oops" command. If, like me, your mind works faster than your fingers, you might type something like "Unlock the doob." Rather than retype the whole command, simply typing "oops door" will correct it. Nifty!

A Mind Forever Voyaging is an essential addition to the library of any ST owner who loves Infocom games as much as I do. Whatever else they may have in the works for 128K-minimum computers will have to go a long way to beat this.

New Products

Rising Star Industries has announced the first of what will apparently be a series of software development utility packages. **Resource Disk—Volume 1** ($79.95) contains a command line interpreter called COMMAND.PRG that's similar to the interpreter in the Developer's Toolkit. The disk also contains a modem program, a file comparison utility and other goodies.

Rising Star Industries, 25500 Hawthorne Boulevard, Suite 2000, Torrance, CA 90505. (213) 373-9112. PRESS.

Activision's **Hacker** ($44.95), demonstrated at COMDEX, has reached the **Antic** offices in final form. Nice graphics. A real improvement over the 8-bit version. We're still awaiting **Borrowed Time** ($49.95) and **Mindshadow** (no price at press time).

Activision, P.O. Box 7286, Mountain View, CA 94043. (415) 960-0410. FINAL/PRESS.

After all the publicity on **Brataccas** ($44.95), it's nice to see that the game has made it into the marketplace. From Psygnosis LTD, this sci-fi animated graphics epic includes very nice packaging and a bonus poster by Roger Dean.

Distributed in U.S. by Apex Resources, 17 St. Mary's Court, Brookline, MA 12146. (617) 232-9686. FINAL.

Polarware/Penguin Software has more graphics adventure games coming. **The Coveted Mirror**, **Frank and Ernest's Adventure**, and **Oo-Topos** are all currently in development. Prices are not yet available. Oo-Topos is a space-pirate adventure by Michael Berlyn of Infocom fame. We can't wait.

Polarware/Penguin Software, 830 Fourth Avenue, P.O. Box 311, Geneva, IL 60134. (312) 232-1984. PRESS.

In what is hopefully the continuation of a recent trend, another Macintosh developer is announcing software for the ST. Assimilation, Inc. has officially announced the development of four software applications/utilities and two hardware products. The company, which has not yet named the new ST products, created a macro-key programmer and a printer spooler for the Mac. Also in the works is an ST version of their successful Macintosh **Turbo Touch**—a trackball-like device—for the ST.

Assimilation, Inc., 485 Alberto Way, Los Gatos, CA 95030. (408) 395-7679. PRESS.

Firestorm ($15) is a new arcade game from inner fire software. Written entirely in 68000 machine language, Firestorm features a three-track music sequencer, smooth colorful animation and 19 levels of multiple rounds. User groups ordering 10 or more copies of the game directly from inner fire will pay only $10. The company has also announced that the complete source code for the game, music sequencer and custom graphics drivers is available for $100.

inner fire software, P.O. Box 36503, #259, San Jose, CA 95158. PRESS.

Monarch Development has created a Shape & Icon Editor for the ST called **SHICED** ($19.95). This programmer's utility should help you customize your icons. It can also be used to create small graphics shapes to be manipulated by your programs.

Monarch Development, 3927 Fisher Road N.E., Salem, OR 97305. FINAL.

For those game players with monochrome monitors, The Other Valley Software presents **Monkey Business** and **Delta Patrol** ($24.95 each). Delta Patrol is a helicopter arcade blaster and Monkey Business bears a marked resemblance to the classic Donkey Kong.

The Other Valley Software, 8540 Archibald, Suite A, Rancho Cucamonga, CA 91730. (714) 980-0440. FINAL.

Holmes & Duckworth, the unusual programming duo from Mirage Concepts, have thrown their hats into the ST language arena with **Holmes & Duckworth Forth** ($39.95). This is an 83-standard Forth which is fully relocatable with a 32-bit stack and full GEM access. The language was used by Holmes & Duckworth to develop their **ST Toolbox** ($39.95) utilities.

Mirage Concepts, 4055 W. Shaw, #108, Fresno, CA 93711. (209) 227-8369. FINAL.

Ultima II ($59.95), one of the most popular fantasy role-playing games in the 8-bit market, has been translated to the ST. The popular Lord British adventure sits in GEM with full drop-down menus, from which you may choose your armor, weapons, or make other life-and-death decisions. (See this issue's review of another Sierra On-Line ST graphics adventure, **King's Quest II**.)

Sierra On-Line, Coarsegold, CA 93614. (209) 683-6858. FINAL.

The anxiously awaited final installment of the Enchanter trilogy, from Infocom, is here. **Spellbreaker** ($44.95) concludes the fantasy text adventures which began with Enchanter and continued through Sorcerer. All three are very close relatives to the famed ZORK trilogy. Spellbreaker is rated up there in the "expert" category by Infocom. So all you Infocom freaks should find this a real challenge.

Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140. (617) 492-6000. FINAL.

New ST product notices are compiled from information provided by the products' manufacturers. ***Antic*** *assumes no responsibility for the accuracy of these notices or the performance of the product. Each mention is followed by a code word indicating that, at press time,* ***Antic*** *had seen a FINAL marketable version, near-final BETA, earlier ALPHA, incomplete DEMO, or PRESS release.*

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ATARIWRITER PLUS

BUILT-IN SPELLING CHECKER, MAIL MERGE, SUPER-FILES FOR 130XE

AtariWriter Plus is a disk-based upgrade of the good old reliable cartridge AtariWriter. But this enhanced word processing software now includes a spelling checker and mail merge—as well as allowing 130XE owners to take advantage of their computer's full 128K memory.

AtariWriter Plus comes on two disks. The program disk has the 48K version on one side and the 130XE version on the other. The second disk contains the dictionary file for the built-in Atari Proofreader. This spelling checker is easy to use and has its own menu options. It also loads from the Main Menu without wiping out your text buffer!

The manual is well-written, although certainly not as "pretty" as its predecessor. However, it is utilitarian and explains all the features adequately—particularly the new enhancements such as a mail merge option for SynFile+ files, the proofreader, 130XE buffer management, etc. I find this documentation a definite improvement over the original.

All commands from AtariWriter's cartridge version remain unchanged. The new features are controlled by additional command sequences. The manual clearly explains all functions in which the 130XE version is different from the 48K version. It should be pointed out that the 48K version works just fine on a 130XE, it's simply unable to utilize the extra RAM.

AtariWriter Plus allows use of two disk drives, and is totally compatible with old AtariWriter files. All you have to do is load in your AtariWriter file, delete the format line at the top, and choose Global Format options from the Main Menu. The Main Menu also has lead-ins for the Proofreader and the mail merge functions.

The program disk includes a module for constructing your own printer driver. When you select Print File from the Main Menu, you are presented with a choice of Atari printers, which include the upcoming XMM series and a model known as the 1029 (??). If you select Other, you are then allowed to choose from a list of popular third-party printers or the printer driver file you previously created from the construction module.

BY STEPHEN ROQUEMORE

AtariWriter Plus allows you to "print" to a device other than "P:". For instance, you may print to "R1:", the modem port, to transfer your file to another Atari computer. Or you may print your file to a disk using the standard Atari format. The program also allows as many as nine print fonts instead of three. One of the nicest new features is its ability (a la PaperClip) to do double-column printing, even if your printer cannot do reverse line feeds. You also now have a choice between type-over mode and continuous insert mode for text editing.

The Proofreader is easy to use. If you have two drives, the program automatically uses drive 2 for the dictionary file. There are three ways of finding errors—highlight, print and correction. You can search the dictionary and build your own personal dictionary files. The program searches your text file very quickly. When it finds what it thinks is an error, it halts,

continued on page 84



3-D TIC TAC TOE

Can you beat your Atari?

by PIERRE DESLOOVER

3-D Tic Tac Toe is a three-dimensional computerized version of the classic strategy game. This BASIC program can play a rather pedestrian human vs. human game, or a highly challenging match between you and your computer. It will work on any 8-bit Atari computer with 32K memory.

3-D Tic Tac Toe is crafty enough to beat you, yet smart enough not to win all the time! (After all, if your Atari starts getting too smug about its tic tac toe prowess, you're likely to call a halt by pulling the plug.)

To get started, type in Listing 1, TTT.BAS, check it with TYPO II and SAVE a copy before you RUN it.

After the title screen appears, three green grids will appear on the screen. Select [A] for ho-hum human vs. human tic-tac-toe. Or be daring and select [B] to battle a formidable opponent—your Atari computer.

HOW TO PLAY

Pick a level of difficulty. Level one is easier than level three. After you have chosen, some of the squares in the grids will randomly fill up in solid green. The filled squares are your difficulty handicap and cannot be used to make a match.

From here on, it's classic tic tac toe with the added challenge of three dimensions. Match up three squares in a row horizontally, diagonally or vertically—among any (or all) of the three nine-square boards. Meanwhile, try to keep one step ahead of your Atari by blocking any rows it tries to fill.

You're blue. The computer is red. Enter a number 1-27 to move onto a space, then press [RETURN]. If you win by placing three squares in a row in any direction, you'll be prompted to move to a more difficult level.

The only hitch is that the squares aren't numbered. Going from upper left to lower right (just as you do when you're reading) the highest board is numbered 1-9, the middle board is 10-18, and the bottom board is 19-27. You can refer to *Figure 1* as you play.

The computer will keep score (without cheating) for as many matches as you care to play. When you're ready to quit, just type [0] to end the game.

HOW IT WORKS

The algorithm used in 3-D Tic Tac Toe is nothing more than a set of rules that the computer blindly follows. Modeled after the way a human would play tic tac toe, it begins at line 1280 as a series of subroutine calls.

Imagine that a game is in progress and it's your turn. As a crafty tic tac toe player you would probably go through the following procedures:

1. Examine the boards to determine if selection of one square can produce a winning combination on this turn. If not:

2. Examine the boards to determine if it's necessary to block your opponent from winning on the next turn. If not:

3. Examine the boards to determine which square would most likely advance you towards a winning combination.

The algorithm needs to recognize, examine and interpret developing cubic tic tac toe patterns on the playing boards, as well as matching and comparing them with established winning patterns. So it's necessary to find an

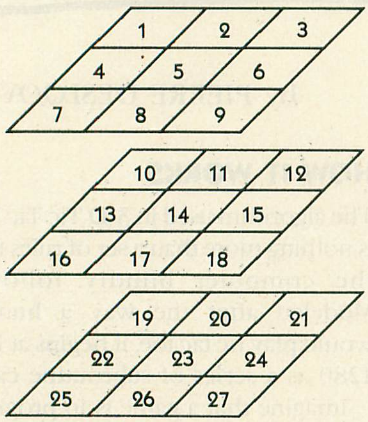
continued on next page

continued from page 83

efficient way to represent this information and make it available to the algorithm. This is accomplished in 3-D Tic Tac Toe with a combination of arrays (indexes subject to minimum and maximum allowable values) and Atari BASIC's LOCATE command.

Every possible win is stored in every conceivable order in a two-dimensional array called TR. Each row of the array stores the X and Y screen coordinates corresponding to a point (or pixel) within the interior surface of a square represented on the actual screen. Each pair of X,Y coordinates defines one square. Three of these pairs in a row, horizontally, diagonally, etc., make up a winning pattern.

Figure 1



Numbered Square Layout

An index, or pointer, Z1, enables the program to selectively access and compare any individual square or combination of squares stored within array TR. Z1 is assigned initial minimum and maximum values to define the range of the search and to limit the number of combinations checked. This greatly reduces the ammount of time the computer needs to find a winning row. Index Z1 is incremented or decremented by the algorithm as needs require. You'll find SSI, the subroutine that sets up this search index, located at line 230.

The program uses the LOCATE command extensively as a convenient way to extract information directly from the screen. Also the square currently being used by the game is noted internally, using a one-dimensional array (or list) CH. Each element of CH corresponds to a single square and is used to record a unique number. The algorithm interprets the number as a square's usage (or state) code. Four of these state codes are possible. After each player takes a turn, CH and its values are updated.

CH has one-to-one correspondence with TMB, a third array used in the program. TMB provides unique X,Y coordinates to be used by the square as a go-between for the one-to-many relationships existing between TMB and TR.

PROGRAM TAKE-APART

Lines 50-190—Reset and draw boards for new game.

200-220—XIO fill square and sound.

230-250 - Set search index limits.

260-280 - Convert index S1 to MOVE.

290-460 - Inspect for existing win combination.

470-620 - Block opponent if necessary.

630-810 - Choose a winning square.

820-990 - Advance towards win with logical choice.

1000-1210 - Game end detect, user options.

1220-1470 - Main playing control loop.

1480-1490 - Flash colors.

1500-1510 - Sound slide whistles.

1520-1880 - Game initializations, data.

Pierre Desloover of Seattle, Washington is a programmer for MicroPhonics Technology, a maker of speech recognition systems for IBM PC's and compatibles. He is the author of **Anti Pong**, available on Antic Public Domain Disk #PD009.

Listing on page 98

ATARIWRITER PLUS
continued from page 81

highlights the word, and gives you a choice between Accept, Correct, or Search the dictionary. If you accept the highlighted word as is, the proofreader doesn't stop at later occurrences of the same word.

The mail merge feature is actually a mini-database/filer program. It has all the features and capabilities of a small database program, including creating a "form" for data entry of records. These records can then be incorporated into your AtariWriter Plus files. You may also merge files created with SynFile+.

AtariWriter Plus is a great improvement over the cartridge version. However, it does have a few drawbacks. The heavy copy protection prevents backup copies, and there's no double density DOS capability for file storage. The 48K version's maximum file buffer size is only 15K, considerably smaller than the 25-30K text buffers found in competing software such as PaperClip and Letter Perfect.

The advantage of the 130XE version is that it uses the extra RAM as additional text buffer space, allowing the creation of very large documents. However, the 130XE's extra memory is merely divided into three 15K buffers. And switching between the buffers is not automatic, you must press [START] B.

Overall, AtariWriter Plus is an example of Atari-built software at its best. If you are in the market for a powerful, easy-to-use word processor, or if you are dissatisfied by the other word processors available, you owe it to yourself to check out AtariWriter Plus. By the way, this review was written entirely with AtariWriter Plus and verified using the Proofreader.

ATARIWRITER PLUS
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49.95, 48K disk

product reviews

GOONIES

Datasoft/H.P. Software
19808 Nordhoff Place
Chatsworth, CA 91311
(818) 886-5922
$29.95, 48K disk

Reviewed by Brad Kershaw

Goonies is a run, jump and climb game with a twist. I enjoyed playing even though I haven't seen the movie it is based on.

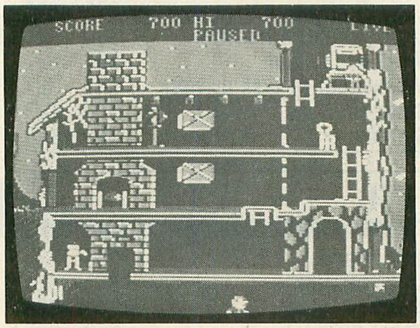
Your task is to make it through all eight screens, solving the puzzle each one presents—until you finally find One-eyed Willy's Pirate Ship with its treasure that will save the homes of your family and friends from foreclosure. All the while you must avoid the evil Fratelli gang. This sounds easy, but it's not. The twist that I spoke of earlier is that there are *two* little Goonies characters that you must successfully guide through the perils of each screen.

The Goonies are multi-colored animated figures, each with its own distinctive look. Every time you advance to a new screen, the computer randomly selects a new pair of the movie characters—Mikey, Brand, Mouth, Data, Stef, Andy and Chuck.

You can shift back and forth between Goonies by pushing the joystick button. You may also choose between left-handed or right-handed play. This is done by simply choosing that option at the beginning of the game, a nice feature for all you southpaws out there.

Goonies is also different in that it is based on cooperation between the pairs of little people which you control. For example, you might move one of your characters to a device that keeps the opposition busy while you move your other character to a safe area. It is actually impossible to get through any screen without teamwork between friends.

The graphics are fairly good. Each of the eight levels is a different cutaway view of a house, mountain, or cavern. The obstacles in each level are also detailed and animated. Another plus for this game is that the music is from the film's popular soundtrack. I also noticed that unlike Conan, another Datasoft game, having a lot of animated characters and objects on the screen don't slow down the action.



I played this game for a number of hours and never made it all the way to the pirate treasure. Despite help from the hint book and the official treasure map, Goonies is very challenging—even for an old arcade gamer like me. But that's what I enjoyed about Goonies. It doesn't get boring and should keep you playing into the wee hours of the morning.

I hope other games adopt this onscreen teamwork style. It makes for some very interesting challenges. You have to use your head and be quick on the draw to get two chararacters out of a hopeless situation.

Q-MODEM

Quantum Microsystems, Inc.
P.O. Box 179
Liverpool, NY 13088
(315) 451-7747
$149.95, 48K disk

Reviewed by Brad Kershaw

For lower budgets, the 300 baud **Q-Modem** by Quantum Microsystems is a powerful but convenient modem for Ataris. Q-Modem connects directly to your Atari computer and does NOT require the Atari 850 interface. It can be daisy-chained like any other Atari peripheral.

No larger than two packs of extra-long cigarettes, Q-Modem will autodial and autoanswer. It has a telephone database and a real-time clock built into its software. The software also allows you to listen in on your connection via your video speaker.

Even though this is not a smart modem, the software does a good job of emulating many of the features found on the more expensive models. Quantum is planning a 1200 baud upgrade kit ($79), plus a new modem for the ST.

DECISION IN THE DESERT

MicroProse Software
120 Lakefront Drive
Hunt Valley, MD 21030
(301) 667-1151
$39.95, 48K disk

Reviewed by Rich Moore

Decision in the Desert is a fast-paced simulation of the Allied and Axis campaign in North Africa during World War II. The second of MicroProse's Command Series wargames, it does an outstanding job of portraying engagements between swift, mechanized forces in the open desert. This is a very tactical game. Players must employ (and expect) fast maneuvers over relatively long distances. Victory is not at all certain for either side. The fortunes of war shift rapidly as battles develop and each side's forces reach the limits of their resources.

The game can be played solo against the computer or "head to head" with another player. You can

even let the computer play against itself and just sit back to watch the action! Three game speeds can be selected, the fastest running about 70 minutes of game time for every minute of real time. The simulation is fully interactive and runs continuously, based upon the last orders given.

Players select from a total of 11 variations of five major North African operations. Most are historical, but some allow you to play "what if. . ." Play balance can be adjusted by increasing the power of either side's units. You can see all enemy units or select "limited intelligence" to display only enemy units in recent contact. Games can be saved to disk and reloaded at any time during play.

A broad range of infantry, armor, artillery and air units are under the player's command. They vary in size from brigade to division level. Some crack units have experience, which greatly increases their effectiveness. Some are manned by green troops who can barely hold their own. As units engage, their effectiveness is reduced by losses. Resupply will eventually restore their capabilities, but you must continuously ensure that your supply lines remain clear. Terrain, weather and night all effect each unit's abilities to move and fight.

The graphics are truly superb and make the game a real pleasure to play. Each scenario has its own appropriately scrolling high-resolution, multicolored map. Cities, roads and many different types of terrain features are clearly represented. The screen takes on a sandy color during the day and turns dark at night. Units may be displayed by standard military symbols or by icons which "picture" the unit type. Resupply at midnight is shown by rapidly moving truck icons. Text messages announce arrival at objectives, capture of important points, combat losses and lack of supplies.

All in all, Decision in the Desert is a simulation that should be in every wargamer's library. It is well thought out and documented, including the excellent historical narratives for each operation. The mechanics of the simulation are very easy to learn and are fully consistent with the player's role. It can be played so fast that people who normally prefer arcade games should find it both interesting and challenging—even addictive. In fact, I've got to quit now and get back to those Panzer divisions trying to sweep around my southern flank . . .

CROSSWORD MAGIC

Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
(800) 221-9884
$39.95, 48K disk

Reviewed by Michael Lasky

Crossword puzzles maintain their vast popularity year after year. These puzzles—in which intersecting words are placed in blank squares in a grid—are now the single most published type of game in the world.

No matter how good you are at solving crosswords, the actual creation of a new crossword puzzle is guaranteed hard work. You need to verify that the cross-hatch of words with letters common to the horizontal and vertical columns fit accurately into a balanced geometric pattern and are supported by logical clues.

Crossword Magic is a software tool that takes the drudgery out of trial and error testing of up and down word patterns. Essentially, it is a word processor dedicated to the connection of words that share the same letters.

You'll still need to keep a good dictionary and almanac handy because the program doesn't select your words or invent your clues. The 30-page instruction booklet is written clearly with straightforward explanations that take you step-by-step through the eight part menu-driven program.

Crossword Magic starts you with a 3×3 grid (nine boxes). As you enter the answers,for which clues will be added later, the grid adjusts in size to fit your words. A single-key command will lock this adjustment anytime you want. If you don't like where a word has been placed, pressing [CONTROL][R] will start the computer searching for another position to fit it.

If you type a word that does not fit into the puzzle (as you fill up the grid, this will happen more often), a buzz sounds and the word goes into an unused word file. If you later add a word to your puzzle that allows the unused word to fit, both are immediately highlighted on your working grid.

One confusing program design has the [RETURN] key as a space tab and the [SPACEBAR] as the across/down word toggle. Movement of the cursor is done with the usual [CONTROL] and arrow keys.

At any point you can test-play the puzzle without committing it to final save on a disk. Printed copies, however, are the only ones that will have numbers in the answer boxes, a shortcoming since onscreen numbers would make composition easier.

Crossword Magic configures with more than two dozen dot-matrix and inkjet printers. To save puzzles—either completed or in progress—a separate blank disk is needed which the program formats.

Designing your own crosswords can be just as challenging as solving them. And with the steady demand for crossword puzzles in newspapers and other publications, Crossword Magic could be an income-producing tool as well.

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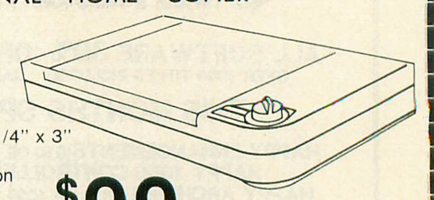
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Antic type-in listing section includes every full-length program from this issue. Listings are easier to type and proofread, easy to remove and save in a binder if you wish.

DISK SUBSCRIBERS: You can use all these programs immediately. Just follow the instructions in the accompanying magazine articles.

Antic program listings are typeset on the Star's SB-10 printer—from Star Micronics, Inc., 200 Park Avenue, New York, NY 10166.

TYPING SPECIAL ATARI CHARACTERS

Antic printed program listings leave a small space between each Atari Special Character for easier reading. Immediately below you will see the way **Antic** prints all the standard Atari letters and numbers, in upper and lower case, in normal and inverse video.

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
abcdefghijklmnopqrstuvwxyz
0123456789          0123456789
```

The Atari Special Characters and the keys you must type in order to get them are shown in the two boxes below.

NORMAL VIDEO

FOR THIS	TYPE THIS	FOR THIS	TYPE THIS
♥	CTRL ,	●	CTRL T
	CTRL A		CTRL U
	CTRL B		CTRL V
	CTRL C		CTRL W
	CTRL D		CTRL X
	CTRL E		CTRL Y
	CTRL F		CTRL Z
	CTRL G		ESC ESC
	CTRL H	↑	ESC CTRL −
	CTRL I	↓	ESC CTRL =
	CTRL J	←	ESC CTRL +
	CTRL K	→	ESC CTRL *
	CTRL L	◆	CTRL .
	CTRL M	♠	CTRL ;
	CTRL N		SHIFT =
	CTRL O		ESC SHIFT CLEAR
♣	CTRL P		
	CTRL Q		
	CTRL R	◀	ESC DELETE
	CTRL S	▶	ESC TAB

INVERSE VIDEO

FOR THIS	TYPE THIS	FOR THIS	TYPE THIS
	ΛCTRL ,		ΛCTRL Y
	ΛCTRL A		ΛCTRL Z
	ΛCTRL B		ESC SHIFT DELETE
	ΛCTRL C		
	ΛCTRL D		
	ΛCTRL E		ESC SHIFT INSERT
	ΛCTRL F		
	ΛCTRL G		
	ΛCTRL H		ESC CTRL TAB
	ΛCTRL I		
	ΛCTRL J		
	ΛCTRL K		ESC SHIFT TAB
	ΛCTRL L		
	ΛCTRL M		
	ΛCTRL N		ΛCTRL .
	ΛCTRL O		ΛCTRL ;
	ΛCTRL P		ΛSHIFT =
	ΛCTRL Q		ESC CTRL 2
	ΛCTRL R		ESC CTRL DELETE
	ΛCTRL S		
	ΛCTRL T		
	ΛCTRL U		ESC CTRL INSERT
	ΛCTRL V		
	ΛCTRL W		
	ΛCTRL X		

Whenever the CONTROL key (CTRL on the 400/800) or SHIFT key is used, *hold it down* while you press the next key. Whenever the ESC key is pressed, *release* it before you type the next key.

Turn on inverse video by pressing the Reverse Video Mode Key . Turn it off by pressing it a second time. (On the 400/800, use the Atari Logo Key Λ instead.)

Among the most common program typing mistakes are switching certain capital letters with their lower-case counterparts—you need to look especially carefully at P, X, O and 0 (zero).

Some of Atari Special Characters are not easy to tell apart from standard alpha-numeric characters. Usually the Special Characters will be boxed. Compare the two sets of characters below:

SPECIAL			STANDARD		
		CTRL F	/		/
		CTRL G	\		SHIFT +
		CTRL N	—		SHIFT -
		CTRL R	-		–
		CTRL S	+		+

HOW TO USE TYPO II

TYPO II is the improved automatic proofreading program for **Antic's** type-in BASIC listings. It finds the exact line where you made a program typing mistake.

Type in TYPO II and SAVE a copy to disk or cassette. Now type GOTO 32000. When you see the instruction on the screen, type in a single program line **without the two-letter TYPO II code** at left of the line number. Press [RETURN].

Your line will reappear at the bottom of the screen with a two-letter TYPO II code on the left. If this code is not exactly the same as the line code printed in the magazine, you mistyped something in that line.

To call back any line previously typed, type an asterisk [*] followed (without in-between spaces) by the line number, then press [RETURN]. When the complete line appears at the top of the screen, press [RETURN] again. This is also the way you use TYPO II to proofread itself.

To LIST your program, press [BREAK] and type LIST. To return to TYPO II, type GOTO 32000.

To remove TYPO II from your program, type LIST "D:FILENAME",0,31999 [RETURN] (Cassette owners LIST "C:). Type NEW, then ENTER "D:FILENAME" [RETURN] (Cassette—ENTER "C:). Your program is now in memory without TYPO II and you can SAVE or LIST it to disk or cassette.

Owners of the BASIC XL cartridge from O.S.S. type SET 5,0 and SET 12,0 before using TYPO II.

Don't type the TYPO II Codes!

```
WB 32000 REM TYPO II BY ANDY BARTON
VM 32010 REM VER. 1.0 FOR ANTIC MAGAZINE
HS 32020 CLR :DIM LINE$(120):CLOSE #2:CLO
   SE #3
BN 32030 OPEN #2,4,0,"E":OPEN #3,5,0,"E"
YC 32040 ? "K":POSITION 11,1:? "TYPO II "

EM 32050 TRAP 32040:POSITION 2,3:? "Type
   in a program line"
HS 32060 POSITION 1,4:? " ":INPUT #2;LINE
   $:IF LINE$="" THEN POSITION 2,4:LIST B
   :GOTO 32060
XH 32070 IF LINE$(1,1)="*" THEN B=VAL(LIN
   E$(2,LEN(LINE$))):POSITION 2,4:LIST B:
   GOTO 32060
TH 32080 POSITION 2,10:? "CONT"
MF 32090 B=VAL(LINE$):POSITION 1,3:? " ";
NY 32100 POKE 842,13:STOP
CN 32110 POKE 842,12
```

Don't type the TYPO II Codes!

```
ET 32120 ? "K":POSITION 11,1:? " TYPO II 
   ":POSITION 2,15:LIST B
CE 32130 C=0:ANS=C
QR 32140 POSITION 2,16:INPUT #3;LINE$:IF
   LINE$="" THEN ? "LINE ";B;" DELETED":G
   OTO 32050
VV 32150 FOR D=1 TO LEN(LINE$):C=C+1:ANS=
   ANS+(C*ASC(LINE$(D,D))):NEXT D
WJ 32160 CODE=INT(ANS/676)
JW 32170 CODE=ANS-(CODE*676)
EH 32180 HCODE=INT(CODE/26)
BH 32190 LCODE=CODE-(HCODE*26)+65
HB 32200 HCODE=HCODE+65
IE 32210 POSITION 0,16:? CHR$(HCODE);CHR$
   (LCODE)
VG 32220 POSITION 2,13:? "If CODE does no
   t match press RETURN and edit line a
   bove.":GOTO 32050
```

ERROR FILE

ATARI 'TOONS

August 1985

The 22nd character in line 1090 of listing 2 is an A. Also, to load non-standard character sets, change NUMBER=1024 in line 1140 to: NUMBER=2050, and change line 1150 to: 1150 GOTO 1170.

GUESS THAT SONG

July 1985

The September, 1985 HELP! section contains an easier-reading listing of some of the tougher data lines in Guess That Song.

STAR VENTURE

July 1985

Change line 380 to:

```
380 IF PEEK(53279
)=6 THEN SOUND 0,
0,0,0:GOTO 80
```

MUSICIAN

June 1985

Change line 790 to:

```
790 IF A=54 THEN
POSITION 4,22:? #
6;"song cleared":
GOTO 810
```

And if you're having tempo problems, remove line 1720 and add the following:

```
1715 IF A=14 THEN
 TEMPO=-0.25:GOTO
 1700
1720 REM REMOVE T
HIS LINE
```

MANEUVER

April 1985

If you get hearts on the title screen, LIST the program to disk or cassette, type NEW, then ENTER and SAVE it.

FONT MAKER FOR SG-10

March 1985

The July 1985 issue of ANTIC contains a listing which, when merged with FONT MAKER, makes that program work on the Star SG-10. See the HELP section of that issue for instructions.

CUSTOM PRINT

March 1985

Custom Print has problems printing certain characters using redefined characters. Change line 5 to:

```
5 CS=PEEK(106)-8:
POKE 106,CS-1:GRA
PHICS 0:DIM CST$(
20):CST$=""
```

FRACTAL ZOOM

Article on page 16

LISTING 1

Don't type the TYPO II Codes!

```
TM 10 REM FRACTAL ZOOM
KZ 20 REM BY CHARLES JACKSON
FW 30 REM (c) 1985, ANTIC PUBLISHING
OL 50 BRK=1:IF PEEK(53279)=5 THEN BRK=0
KH 55 RAMDSK=0
XT 60 DIM PLY1$(229),PLY2$(229),PM$(100),
   F$(18),P$(1),DAT$(18)
TT 62 GOTO 70
JG 65 POKE 77,0:IF BRK THEN POKE 16,112:P
   OKE 53774,112
AI 66 RETURN
LJ 70 GOSUB 65:? "↖▮reate a New fractal":
   ? :? "▮oad one from disk";:INPUT P$
EY 80 IF  NOT (P$="C" OR P$="L") THEN 70
KT 90 IF P$="L" THEN 1320
WC 100 ? "↖MODE (8 - 11, 15)";:INPUT MODE
   :IF  NOT ((MODE>7 AND MODE<12) OR MODE
   =15) THEN 100
UA 110 GOSUB 1210:GOSUB 1280:GOSUB 1180
MQ 120 ? "↖":POSITION 2,15:? "DEFAULTS AR
   E:":LIST 160,162
JG 130 FOR X=17 TO 19:POSITION 1,X:? "▮▮▮
   ▮":NEXT X
LR 140 POSITION 2,2:? "ENTER ACORNER, BCO
   RNER, SIDE"
ZT 150 TRAP 160:INPUT ACORNER,BCORNER,SID
   E:GOTO 170
WU 160 ACORNER=-2
OU 161 BCORNER=-1.145288
OA 162 SIDE=0.253866
BZ 170 TRAP OUT
IN 180 IF MODE=15 THEN GOSUB 600
RX 190 IF MODE=8 THEN GRAPHICS 8+16:POKE
   710,0
SY 200 IF MODE=9 THEN GRAPHICS 9
AY 210 IF MODE=11 THEN GRAPHICS 11
UK 220 IF MODE=10 THEN GRAPHICS 10:FOR X=
   0 TO 8:POKE 704+X,18*X:NEXT X
IC 230 GOSUB 65:GOSUB 1600
WA 250 UP=1/2.1:COLFACT=(COL-1)/(MAXITER^
   UP)
RJ 255 OPEN #2,8,0,DAT$:SCR=PEEK(88)+PEEK
   (89)*256
LU 260 FOR N=0 TO HEIGHT
MD 270 FOR M=0 TO LNGTH
QT 280 BC=N*GAPH+BCORNER
RT 290 AC=M*GAPL+ACORNER
IH 300 AZ=0:BZ=0
OI 310 COUNT=1:POKE 77,0
JG 320 AZ2=(AZ*AZ)-(BZ*BZ)+AC
TA 330 BZ2=2*AZ*BZ+BC
FN 340 AZ=AZ2:BZ=BZ2
GI 350 SIZE=AZ2*AZ2+BZ2*BZ2
SI 360 IF SDMCTL THEN POKE 559,0:IF PEEK(
   53279)=6 THEN POKE 559,34
RK 370 IF BRK THEN POKE 16,112:POKE 53774
   ,112
HO 380 IF PEEK(53279)=2 OR PEEK(53279)=3
   THEN IOCTL=8:POP :POP :GOTO 480
FO 390 IF SIZE>4 THEN 410
YL 400 COUNT=COUNT+1:IF COUNT<=MAXITER TH
   EN 320
SV 410 GOSUB 1500
HU 420 IF MODE=15 THEN GOSUB 1660:GOTO 45
   1
JX 450 PLOT M,N
VU 451 IF MODE<>8 THEN PUT #2,COUNT
IH 454 IF COUNT>MAXCNT THEN MAXCNT=COUNT
DN 456 IF COUNT<MINCNT THEN MINCNT=COUNT
HU 460 NEXT M
IG 470 NEXT N
OE 480 CLOSE #2:MF=100/(MAXCNT-MINCNT):BF
   =1-MF*MINCNT
AF 490 POKE 559,34:SKIP=0
TD 492 COUNT=MAXCNT:GOSUB 1500:KLR1=KLR:C
   OUNT=101:GOSUB 1500:SKIP=(KLR1=KLR)
BY 493 COUNT=MINCNT:GOSUB 1500:KLR1=KLR:C
   OUNT=1:GOSUB 1500
ZH 500 TRAP OUT:CLOSE #1:IF ((SKIP AND (K
   LR1=KLR)) OR (MODE=8)) THEN 509
ZD 501 OPEN #1,4,0,DAT$
DT 502 FOR N=0 TO HEIGHT:FOR M=0 TO LNGTH
   :GET #1,A:POKE 77,0
RL 503 COUNT=INT(MF*A+BF+0.5):GOSUB 1500
JT 504 IF MODE=15 THEN GOSUB 1660:GOTO 50
   6
KD 505 PLOT M,N
SQ 506 IF SDMCTL THEN POKE 559,0:IF PEEK(
   53279)=6 THEN POKE 559,34
XW 507 GOSUB 65
JW 508 NEXT M:NEXT N
KE 509 IOCTL=8:GOSUB 650
KP 510 IF RAMDSK THEN DAT$(2,2)=STR$(DRV)
CT 514 CLOSE #1:OPEN #1,8,0,DAT$
NL 515 ? #1;MODE:? #1;ACORNER:? #1;BCORNE
   R:? #1;SIDE:CLOSE #1
HC 520 GRAPHICS 0:POKE 752,1
BN 530 ? F$;" IS DONE":? :? "Press ▮START
   ▮ to continue."
ZX 540 IF PEEK(53279)<>6 THEN 540
RP 550 IOCTL=4:IF MODE=15 THEN GOSUB 600:
   GOSUB 650:GOTO 690
JX 560 IF MODE=8 THEN GRAPHICS 8+16:POKE
   710,0:GOSUB 650:GOTO 690
UJ 570 IF MODE=9 THEN GRAPHICS 9:GOSUB 65
   0:GOTO 690
PZ 580 IF MODE=11 THEN GRAPHICS 11:GOSUB
   650:GOTO 690
UN 590 IF MODE=10 THEN GRAPHICS 10:FOR X=
   0 TO 8:POKE 704+X,18*X:NEXT X:GOSUB 65
   0:GOTO 690
JA 600 GRAPHICS 8+16
OK 610 JNK=USR(ADR("h▬0◻◘P▬1◻◘@■P▷N◘P■◪1P
   I▖P▮▷▁◘PT0P▮▷N◘PH◘M▩▷N◘W♦"))
MF 640 POKE 710,0:POKE 709,148:POKE 708,5
   2:POKE 712,196:RETURN
CA 650 CLOSE #1:OPEN #1,IOCTL,0,F$
QC 660 IO=848:POKE IO+2,IOCTL+3:POKE IO+4
   ,PEEK(88):POKE IO+5,PEEK(89):POKE IO+8
   ,0:POKE IO+9,30
KL 670 JNK=USR(ADR("hhh▩LV▮"),16):CLOSE #
   1
ZS 680 RETURN
FB 690 X=XZ:Y=XZ
RV 700 POKE 559,46:POKE 764,255
WD 710 PMBASE=124:POKE 54279,PMBASE:PMB=P
   MBASE*256
PW 720 POKE 559,46:POKE 53277,3
XI 730 JNK=USR(ADR("h▬o◻▖H▬o◻♦")):REM SET
   S BIT 1 OF GPRIOR
CK 740 PX1=47:PX0=211:HITE=97:DIST=77:ZOO
   M=1
BD 750 ST=STICK(XZ):IF PEEK(764)=255 THEN
    870
RF 760 IF PEEK(764)=50 THEN HITE=97:DIST=
   77:ZOOM=1
KJ 770 IF PEEK(764)=48 THEN HITE=88:DIST=
   70:ZOOM=0.9091
YD 780 IF PEEK(764)=53 THEN HITE=78:DIST=
   62:ZOOM=0.8051
BN 790 IF PEEK(764)=51 THEN HITE=72:DIST=
   57:ZOOM=0.7415
GA 800 IF PEEK(764)=27 THEN HITE=59:DIST=
   47:ZOOM=0.6415
JA 810 IF PEEK(764)=29 THEN HITE=54:DIST=
   43:ZOOM=0.5585
YC 820 IF PEEK(764)=24 THEN HITE=44:DIST=
   35:ZOOM=0.4546
OG 830 IF PEEK(764)=26 THEN HITE=34:DIST=
```

```
   27:ZOOM=0.351
EY 840 IF PEEK(764)=30 THEN HITE=29:DIST=
   23:ZOOM=0.299
YJ 850 IF PEEK(764)=31 THEN HITE=19:DIST=
   15:ZOOM=0.196
XA 860 POKE 764,255
QK 870 PX0=2*DIST+PX1
MO 880 IF Y+HITE>97 THEN Y=97-HITE
BS 890 IF  NOT (PEEK(644)) THEN 1110
BY 900 IF (Y>0) AND (ST=10 OR ST=14 OR ST
   =6) THEN Y=Y-C1
RY 910 IF (Y+HITE<97) AND (ST=13 OR ST=9
   OR ST=5) THEN Y=Y+C1
KF 920 IF PX1>47 AND ST>8 AND ST<12 THEN
   X=X-1:PX1=PX1-1:PX0=PX0-1
AX 930 IF (PX0<201) AND (ST>4 AND ST<8) T
   HEN X=X+1:PX1=PX1+1:PX0=PX0+1
CK 940 IF Y<XZ THEN Y=XZ
ZG 950 PY1=15+Y
BM 960 IF HITE+PY1>111 THEN PY1=112-HITE
BO 970 IF PX0>201 THEN PX1=201-2*DIST:PX0
   =201
JF 980 PM$(1,50)="XhhhUh i NhMhLhKhh
   Phh0hh e00&UP+ZM i MZNi"
NW 982 PM$(51,100)="♥NJPP ♥ ♥D0 +D00 ITN
   (IKSTrMh)♥P )♥rMH@♥P &UZP ♥P◆"
AB 984 MOVE=ADR(PM$)
FG 990 IF MODE=8 THEN POKE 704,14:POKE 70
   5,14
YN 1000 GOSUB 1040
PO 1010 JNK=USR(MOVE,XZ,PMB,ADR(PLY1$),PX
   0,PY1,LEN(PLY1$))
ZO 1020 JNK=USR(MOVE,C1,PMB,ADR(PLY2$),PX
   1,PY1,LEN(PLY2$))
RX 1030 GOTO 750
AP 1040 PLY1$="♥":PLY1$(HITE)=PLY1$:PLY1$
   (2)=PLY1$:PLY2$=PLY1$
TY 1050 PLY1$(1,8)="DHHHHHHH"
SD 1060 PLY1$(LEN(PLY1$)-7,LEN(PLY1$))="H
   HHHHHHD":PLY2$=PLY1$:PLY2$(1,8)="D♥♥♥♥
   ♥♥♥"
MA 1090 PLY2$(LEN(PLY2$)-7,LEN(PLY2$))="♥
   ♥♥♥♥♥♥D":RETURN
CZ 1110 KOL=INT(MFACT*PX1+BFACT+0.5):ROW=
   INT(2*PY1-30+0.5)
ZH 1120 IF KOL<0 THEN KOL=0
VE 1130 IF ROW<0 THEN ROW=0
BG 1140 ACORNER=ACORNER+(GAPL*KOL)
SJ 1150 BCORNER=BCORNER+(GAPH*ROW)
US 1160 SIDE=SIDE*ZOOM
CL 1170 POKE 53248,1:POKE 53249,1:GOSUB 1
   180:GOTO 170
LP 1180 GRAPHICS 0:? "SAVE filename";:INP
   UT PLY1$:IOCTL=8
HV 1190 GOSUB 1380:IF ERR THEN 1180
JU 1195 DAT$=F$:DAT$(LEN(F$)+1)=".DAT"
AD 1200 RETURN
CM 1210 MAXITER=100:HEIGHT=191:LNGTH=159:
   COL=4:C1=1:X2=255:XZ=0:IO=848:OUT=4000
   0
LZ 1220 MFACT=0.501275368:BFACT=-24.06121
   77
WP 1230 IF MODE=8 THEN HEIGHT=191:LNGTH=3
   19:COL=2
AC 1240 IF MODE=10 THEN HEIGHT=191:LNGTH=
   79:COL=9
EE 1250 IF (MODE=9) OR (MODE=11) THEN HEI
   GHT=191:LNGTH=79:COL=16
AL 1260 IF MODE=8 OR MODE=15 THEN MFACT=M
   FACT*4:BFACT=BFACT*4
AY 1270 RETURN
PR 1280 ? "↖SCREEN ON (Y/N)";:INPUT P$
CY 1290 IF  NOT (P$="Y" OR P$="N") THEN 1
   280
TK 1300 SDMCTL=(P$="N"):RETURN
UO 1320 ? "↖File to Load";:INPUT PLY1$:GO
   SUB 1380:IF ERR THEN 1320
XT 1330 PLY1$=F$:PLY1$(LEN(F$)+1)=".DAT"
JA 1340 TRAP 1320:CLOSE #1:OPEN #1,4,0,PL
   Y1$
KU 1350 INPUT #1,MODE:INPUT #1,ACORNER:IN
   PUT #1,BCORNER:INPUT #1,SIDE:CLOSE #1
WS 1360 GOSUB 1210:GOSUB 1280:GOSUB 1600
KX 1370 TRAP OUT:? :? "Press  START  to b
   egin":GOTO 540
PE 1380 IF LEN(PLY1$)<3 THEN 1390
SI 1382 IF PLY1$(1,1)="D" AND PLY1$(3,3)=
   ":" THEN F$=PLY1$:GOTO 1400
ST 1385 IF PLY1$(1,2)="D:" THEN PLY1$=PLY
   1$(3)
RH 1390 F$="D1:":F$(4)=PLY1$
ZC 1400 ERR=0:FOR X=1 TO LEN(F$):IF F$(X,
   X)="." THEN ERR=1
JB 1410 NEXT X:IF ERR THEN ? :? "↓BAD FIL
   ENAME↓"
FW 1420 DRV=VAL(F$(2,2)):RETURN
ZS 1500 IF (MODE=9) OR (MODE=11) THEN KLR
   =25-(INT((100/SQR(118-COUNT))+0.8))
SJ 1510 IF MODE=10 THEN KLR=17-(INT((100/
   SQR(139-COUNT))+0.8))
PR 1520 IF MODE=8 THEN KLR=0:IF SIZE>4 TH
   EN KLR=1
YY 1530 IF MODE<>15 THEN 1550
KO 1540 KLR=(3*(COUNT>99))+(2*(COUNT<100
   AND COUNT>25))+(COUNT>2 AND COUNT<26)
OY 1550 COLOR KLR
BB 1560 RETURN
TY 1600 GAPL=10*(SIDE/LNGTH)
CW 1610 GAPH=10*(SIDE/HEIGHT)
RM 1620 MAXCNT=0:MINCNT=MAXITER
TY 1630 UP=1/2.1:COLFACT=(COL-1)/(MAXITER
   ^UP)
VE 1640 IF RAMDSK THEN DAT$(2,2)="8"
BA 1650 RETURN
ID 1660 X=(N*40+INT(M/4)):V=PEEK(SCR+X):F
   AC=USR(ADR("hhh  ♥ ◆"),V)+KLR
PO 1670 POKE SCR+X,FAC:RETURN
```

LISTING 2

```
NH 10 REM FRACTAL ZOOM, LISTING 2
KZ 20 REM BY CHARLES JACKSON
FW 30 REM (c) 1985, ANTIC PUBLISHING
AZ 35 REM CREATES LINES 610, 730, 980-982
    AND 1660
CQ 40 REM (LINES 10-220 MAY BE USED WITH
   OTHER BASIC LOADERS IN THIS ISSUE.
IS 45 REM CHANGE LINE 70 AS NECESSARY.)
MG 50 DIM FN$(20),TEMP$(20),AR$(93)
HO 60 DPL=PEEK(10592):POKE 10592,255
WO 70 FN$="D:LINES.LST":REM THIS IS THE N
   AME OF THE DISK FILE TO BE CREATED
YS 80 GRAPHICS 0:? "      ANTIC'S GENERIC
   BASIC LOADER"
CD 90 ? ,"BY CHARLES JACKSON"
PW 100 POKE 10592,DPL:TRAP 170
PO 110 ? :? :? "Creating ";FN$:? "...plea
   se stand by."
LQ 120 RESTORE :READ LN:LM=LN:DIM A$(LN):
   C=1
BK 130 AR$="":READ AR$
XW 140 FOR X=1 TO LEN(AR$) STEP 3:POKE 75
   2,255
DG 150 LM=LM-1:POSITION 10,10:? "(Countdo
   wn...T-";INT(LM/10);")     "
UY 160 A$(C,C)=CHR$(VAL(AR$(X,X+2))):C=C+
   1:NEXT X:GOTO 130
MZ 170 IF PEEK(195)=5 THEN ? :? :? "↓TOO
   MANY DATA LINES!":? "CANNOT CREATE FIL
   E!":END
CZ 180 IF C<LN+1 THEN ? :? "↓TOO FEW DATA
    LINES!":? "CANNOT CREATE FILE!":END
AL 200 OPEN #1,8,0,FN$
PP 210 POKE 766,1:? #1;A$;:POKE 766,0
AF 220 CLOSE #1:GRAPHICS 0:? " COMPLETED 
   "
HD 1000 DATA 333
DP 1010 DATA 054049048032074078075061085O
   830820400650680820400341041730480O2133
   208173049002133209160003169
LL 1020 DATA 078145208160006177208201015 2
   080041690141452082010792080041690781 45
   208200192205144233169007133
UL 1030 DATA 087096034041041155055051048 0
   320740780750610850830820400650680820 40
   034104173111002009001141111
FN 1040 DATA 002096034041041058082069077 0
   320830690840830320660730840320490320 79
   070032071080082073079082155
OQ 1050 DATA 057056048032080077036040049 0
   440530480410610342161041041041332131 04
   024105002133206104133205104
KE 1060 DATA 133204104133203104104133208 1
```

continued on next page

```
    0410413320910410402410120913320716621З
    240016165205024105128133205
QV  1070 DATA 1652061050341550570560500320
    80077036040053049044049048048041061034
    0001332062022082401600000162
CJ  1080 DATA 0001962091440191962071760151
    32212138168177203164212145205232169000
    240004169000145205200192128
AH  1090 DATA 2082241662131652081570002080
    96034155049054054048032088061040078042
    052048043073078084040077047
MM  1100 DATA 0520410410580860610800690690
    75040083067082043088041058070065067061
    085083082040065068082040034
AP  1110 DATA 1041041040240100101332121690
    00133213096034041044086041043075076082
    155
```

a decision-tree in your Atari

GUESS THE ANIMAL

Article on page 12

LISTING 1

Don't type the TYPO II Codes!

```
DF  10 REM ANIMAL
HK  20 REM BY RANDY DEARDORFF
FW  30 REM (c) 1985, ANTIC PUBLISHING
OK  40 BRK=1:IF PEEK(53279)=5 THEN BRK=0
HN  50 DPL=PEEK(10592):POKE 10592,255
QM  100 GOTO 860
IY  110 ? :? "Think of an animal.  I will
    try to":? "guess it by asking question
    s.":? :N=N1:TRAP 40000
CX  120 NODE$=TREE$(N*NL-2,N*NL):Q=ASC(NOD
    E$(N1,N1)):Y$=NODE$(2,2):N$=NODE$(3,3)

OQ  130 IF Y$="♥" THEN A=Q:G=A:GOTO 170
TL  140 Q$=QX$(Q*QL-36,Q*QL):? Q$:GOSUB 52
    0
WM  150 IF R$="y" THEN N=ASC(Y$):GOTO 120
XV  160 N=ASC(N$):GOTO 120
MU  170 A$=AX$(A*AL-14,A*AL)
QF  180 T=LEN(A$):IF T>N1 AND A$(T,T)=" "
    THEN A$=A$(N1,T-N1):GOTO 180
KB  190 T$=A$:GOSUB 550:? "Is it";P$;A$;"?
    ":GOSUB 520:IF R$="n" THEN 230
KL  200 ? "That was fun!"
OU  210 ? "Want to try again?":GOSUB 520:I
    F R$="y" THEN 110
BV  212 ? :? "Shall I SAVE this data?":GOS
    UB 520:IF R$="y" THEN K=19:? :GOTO 390

SV  220 POKE 82,2:GRAPHICS 0:POKE 10592,DP
    L:END
KQ  230 ? "I give up.  Just what sort of b
    east":? "did you have in mind?"
WD  240 GOSUB 350:IF LEN(R$)>AL OR R$="" T
    HEN ? "1 to 15 letters please.":GOTO 2
    40
EY  250 H$=R$:T$=R$:GOSUB 550:? "Please ty
    pe a question whose answer is YES for"
    ;P$;H$;" and"
SP  260 T$=A$:GOSUB 550:? "NO for";P$;A$;"
    ."
TG  270 GOSUB 350:IF R$(LEN(R$))<>"?" THEN
     ? "That's not a question!":GOTO 270
LK  280 Q$=R$:NA=NA+N1
MF  290 IF NA>MAX OR NN>251 THEN ? "Buffer
     full, record ignored":NA=MAX:GOTO 110

PL  300 LQ=Q:Q=NA:GOSUB 600:A$=H$:A=NA:GOS
    UB 580
TA  310 NODE$=CHR$(A):NODE$(2,2)=CHR$(NN+N
    1):NODE$(3,3)=CHR$(NN+2):GOSUB 620
CI  320 NN=NN+N1:NODE$=CHR$(A):NODE$(2,3)=
    "♥♥":N=NN:GOSUB 620
LK  330 NN=NN+N1:NODE$=CHR$(G):NODE$(2,3)=
    "♥♥":N=NN:GOSUB 620:GOTO 210
CJ  340 REM USER INPUT
MO  350 C=N0:X$=">"
MR  360 R$="":L=N0:POSITION C,PEEK(84):? X
    $;
RK  370 IF BRK THEN POKE 16,112:POKE 53774
    ,112
LN  375 GET #2,K:IF K=155 THEN ? :GOTO 480
GP  380 IF K=126 THEN 450
LI  390 IF K=19 THEN T=8:R$="SAVE":GOTO 67
    0
OL  400 IF K=12 THEN T=4:R$="LOAD":GOTO 67
    0
RQ  410 IF K<32 OR K>122 THEN POKE 694,N0:
    GOTO 370
LQ  420 IF L=QL THEN 370
RV  430 L=L+N1:? CHR$(K);:IF K>64 AND K<91
     THEN K=K+32
LB  440 R$(L,L)=CHR$(K):GOTO 370
PI  450 IF R$="" THEN 370
TG  460 ? "◀";:IF L=N1 THEN 360
HA  470 L=L-N1:R$=R$(N1,L):GOTO 370
FN  480 IF L=N0 THEN RETURN
KJ  490 IF R$(LEN(R$))="?" THEN K=ASC(R$(N
    1,N1)):IF K>96 THEN K=K-32:R$(N1,N1)=C
    HR$(K)
ZB  500 RETURN
OG  510 REM YES/NO
KI  520 GOSUB 350:IF R$>"" THEN R$=R$(N1,N
    1):IF R$="y" OR R$="n" THEN RETURN
EY  530 ? "Come on, yes or no.":GOTO 520
AW  540 REM A/AN
PE  550 P$=" a ":X$=T$(N1,N1):IF (X$="a" O
    R X$="e" OR X$="i" OR X$="o" OR X$="u"
    ) THEN P$=" an "
ZN  560 RETURN
TD  570 REM FILE ANIMAL
BZ  580 T$=A$:L=AL:GOSUB 640:AX$(A*AL-14,A
    *AL)=T$:RETURN
MD  590 REM FILE QUESTION
RY  600 T$=Q$:L=QL:GOSUB 640:QX$(Q*QL-36,Q
    *QL)=T$:RETURN
AU  610 REM FILE KNOWLEDGE NODE
LD  620 TREE$(N*NL-2,N*NL)=NODE$:RETURN
UP  630 REM PAD WITH BLANKS
BQ  640 T=LEN(T$):IF T<L THEN T$(T+N1)=BL$
    (N1,L-T)
ZM  650 RETURN
IH  660 REM LOAD/SAVE
TY  670 POP
WB  675 ? R$;" Device:filename";:C=21:X$="
     ":GOSUB 360:TRAP 110
SL  680 IF L>=2 AND R$(2,2)=":" THEN 710
UO  690 IF L>=3 AND R$(3,3)=":" THEN 710
QE  700 Q$=R$:R$="D:":R$(3)=Q$:L=L+2
WN  710 FOR X=N1 TO L:B=ASC(R$(X,X)):IF B>
    96 THEN R$(X,X)=CHR$(B-32)
MQ  720 NEXT X:POKE 195,N0:TRAP 790:OPEN #
    N1,T,N0,R$
SO  730 IF T=8 THEN QLEN=LEN(QX$):ALEN=LEN
    (AX$):? #N1,NA:? #N1,NN:? #N1,QLEN:? #
    N1,ALEN:GOTO 760
JN  740 INPUT #N1,NA:INPUT #N1,NN:INPUT #N
    1,QLEN:INPUT #N1,ALEN
UI  750 QX$=" ":QX$(QLEN-N1)=QX$:QX$(2)=QX
    $:AX$=QX$(N1,ALEN):TREE$=" ":TREE$(765
    )=TREE$:TREE$(2)=TREE$
JY  760 ADDR=ADR(QX$):SIZE=QLEN:GOSUB 810
MQ  770 ADDR=ADR(AX$):SIZE=ALEN:GOSUB 810
```

```
DO 780 ADDR=ADR(TREE$):SIZE=765:GOSUB 810
LN 790 CLOSE #N1:X=PEEK(195):IF X=N0 THEN
    ? "Okay.":GOTO 110
AY 800 ? "ERROR ";X:GOTO 110
GT 810 IOCB=848:POKE IOCB+2,T+3
YV 820 HI=INT(ADDR/256):LO=ADDR-HI*256:PO
    KE IOCB+4,LO:POKE IOCB+5,HI
JZ 830 HI=INT(SIZE/256):LO=SIZE-HI*256:PO
    KE IOCB+8,LO:POKE IOCB+9,HI
JT 840 TJ=USR(ADR("hhh⊠LV◘"),16):RETURN
CU 850 REM INITIALIZE
DC 860 N0=0:N1=1:GRAPHICS 0:POKE 710,12:P
    OKE 712,12:POKE 709,0:POKE 82,N1:POKE
    83,39
AS 865 MAX=128:QL=37:AL=15:NL=3:CLOSE #2:
    OPEN #2,4,N0,"K:"
OA 870 DIM QX$(QL*MAX),AX$(AL*MAX),TREE$(
    766),Q$(QL),A$(AL),NODE$(NL)
KE 880 DIM H$(AL),R$(QL),T$(QL),BL$(QL),Y
    $(N1),N$(N1),P$(4),X$(N1)
LT 890 TREE$="♥":TREE$(NL*255-N1)=TREE$:T
    REE$(2)=TREE$:BL$=" ":BL$(QL-N1)=BL$:B
    L$(2)=BL$
XZ 900 A$="horse":A=N1:GOSUB 580:A$="crow
    ":A=2:GOSUB 580:NA=A:NN=3
KP 910 Q$="Is it a mammal?":Q=N1:GOSUB 60
    0
XE 920 NODE$="HLP":N=N1:GOSUB 620:NODE$="
    H♥♥":N=2:GOSUB 620:NODE$="]♥♥":N=3:GOS
    UB 620
MF 930 GOTO 110
```

mini-universe on your Atari screen

LIFE REVISITED

Article on page 37.

LISTING 1

Don't type the TYPO II Codes!

```
KJ 2 REM LIFE
ZX 4 REM BY CHARLES JACKSON
FG 6 REM (c) 1985, ANTIC PUBLISHING
JO 10 GRAPHICS 0:DIM FIRST(22,14),SECOND(
    22,14)
MJ 15 GOSUB 10000
LZ 20 FOR X=1 TO 22:FOR Y=1 TO 14
BL 30 FIRST(X,Y)=0:SECOND(X,Y)=0
DG 40 NEXT Y:NEXT X
QG 50 GRAPHICS 2+16:POKE 712,148
KL 60 OLDX=0:OLDY=0:CURX=0:CURY=0:MAXX=1:
    MINX=22
EJ 65 MX=1:MI=22
YQ 70 COLOR 10:PLOT CURX,CURY
ZP 80 D=STICK(0)
CF 81 IF STRIG(0) THEN 90
EY 82 FIRST(CURX+2,CURY+2)= NOT (FIRST(CU
    RX+2,CURY+2))
RR 83 IF CURX+2>MAXX THEN MAXX=CURX+2
MX 84 IF CURX+2<MINX THEN MINX=CURX+2
WO 87 FOR TIME=1 TO 100:NEXT TIME
HT 90 IF D/2=INT(D/2) THEN CURY=CURY-1
KG 100 IF D=9 OR D=13 OR D=5 THEN CURY=CU
    RY+1
FK 110 IF D>8 AND D<12 THEN CURX=CURX-1
CU 120 IF D>4 AND D<8 THEN CURX=CURX+1
NJ 130 CURX=CURX*(CURX>=0):CURY=CURY*(CUR
    Y>=0)
PB 140 IF CURX>19 THEN CURX=19
DW 150 IF CURY>11 THEN CURY=11
KW 160 COLOR 0:PLOT OLDX,OLDY:IF FIRST(OL
    DX+2,OLDY+2)=1 THEN COLOR 120:PLOT OLD
    X,OLDY
QD 165 COLOR 10:PLOT CURX,CURY
VY 170 OLDX=CURX:OLDY=CURY
KC 175 IF PEEK(53279)=6 THEN COLOR 0:PLOT
     OLDX,OLDY:D=1:GOTO 200
SA 180 GOTO 70
NR 200 EXT=1:POKE 709,30:POKE 711,0
MP 210 FOR X=2 TO 13:FOR Y=MINX TO MAXX
XH 215 IF FIRST(Y,X)=0 THEN 250
OI 220 EXT=0:FOR X1=-1 TO 1:FOR Y1=-1 TO
    1
SM 221 GOSUB 500
JB 222 TRAP 40000
UN 230 IF FIRST(Y+Y1,X+X1)=1 THEN IF NBOR
    S=2 OR NBORS=3 THEN SECOND(Y+Y1,X+X1)=
    1:GOSUB 300
AR 232 IF NBORS=3 THEN SECOND(Y+Y1,X+X1)=
    1:GOSUB 300
SN 245 NEXT Y1:NEXT X1
YX 250 NEXT Y:NEXT X:MINX=MI:MAXX=MX:IF E
    XT THEN RUN
DD 260 FOR X=2 TO 13:FOR Y=2 TO 21
XB 265 COLOR (120+128*D)*SECOND(Y,X)
EP 270 FIRST(Y,X)=SECOND(Y,X):PLOT Y-2,X-
    2:SECOND(Y,X)=0
UP 280 NEXT Y:NEXT X
TB 290 D= NOT (D):GOTO 200
FH 300 IF Y+Y1>MX THEN MX=Y+Y1
JR 310 IF Y+Y1<MI THEN MI=Y+Y1
ZD 320 RETURN
MA 500 POKE 77,0:NBORS=0:FOR A=-1 TO 1:FO
    R B=-1 TO 1:IF A=0 AND B=0 THEN 520
JD 505 IF Y+A+Y1>22 OR X+B+X1>14 THEN 520
VB 510 NBORS=NBORS+FIRST(Y+A+Y1,X+B+X1)
RV 520 NEXT B:NEXT A:RETURN
QN 10000 GRAPHICS 2:POSITION 7,4:? #6;"LI
    FE":POKE 710,0:POKE 752,1
HM 10010 ? " Atari Version by Charles Jac
    kson"
WB 10020 ? :? "     (c) 1985, Antic Publis
    hing"
DV 10060 RETURN
```


continued on next page

starting out

NEW OWNERS COLUMN

Article on page 47

LISTING 1

Don't type the TYPO II Codes!

```
RO 10 REM THE NEW OWNERS COLUMN
NI 20 REM DEMO PROGRAM NUMBER TWO
PR 30 REM BY DAVID PLOTKIN
FX 40 REM (c) 1985, ANTIC PUBLISHING
NB 60 REM SET UP THE VARIABLES
FZ 70 DIM NAME$(20),ANS$(2),DRAW$(4),HOLD
   $(100),MSG$(20)
DL 80 REM SET UP THE SCREEN
WE 90 GRAPHICS 0:POKE 752,1:PRINT :REM TU
   RN OFF THE CURSOR
QU 100 REM CYCLE THE SCREEN COLORS AND
          MAKE SOME NOISE
GR 110 FOR W=10 TO 250 STEP 10:POKE 710,W
   :SOUND 0,W,12,4
GQ 120 FOR WAIT=0 TO 20:NEXT WAIT:NEXT W:
   POKE 710,148:SOUND 0,0,0,0:POKE 752,0
NS 130 REM GET THE NAME OF THE READER
JW 140 POSITION 2,5:? "PLEASE TYPE IN YOU
   R NAME":INPUT NAME$
HE 150 IF LEN(NAME$)>18 THEN POSITION 2,8
   :PRINT "OOPS...YOU HAVE A LONG NAME!"
PN 160 POSITION 2,10:? "YOUR NAME IS ";NA
   ME$:POSITION 2,11:? "IS THIS CORRECT (
   Y OR N)";:INPUT ANS$
QA 170 IF ANS$<>"Y" AND ANS$<>"y" THEN GR
   APHICS 0:GOTO 140
PD 180 DRAW$="*◣◥▣":REM ASTERISK,CONTROL-
   J,INVERSE CONTROL-J,INVERSE ASTERISK
EV 185 REM DRAW THE MARQUIS
IZ 190 GRAPHICS 2+16:FOR PS=0 TO 17 STEP
   4:POSITION PS,3:PRINT #6;DRAW$:POSITIO
   N PS,8:PRINT #6;DRAW$:NEXT PS
XP 200 HOLD$="                      AT LEAS
   T I HAVE ONE READER NAMED ":HOLD$(54)=
   NAME$:CNT=1
KT 205 HOLD$(LEN(HOLD$)+1)="
       "
QN 210 MSG$=HOLD$(CNT,CNT+20):CNT=CNT+1:I
   F CNT>LEN(HOLD$)-20 THEN CNT=1
IH 215 REM PRINT THE SCROLLING MESSAGE
AN 220 POSITION 0,5:PRINT #6;MSG$;
YZ 225 REM ROTATE THE COLORS!
WA 230 HLD=PEEK(708):POKE 708,PEEK(709):P
   OKE 709,PEEK(710):POKE 710,PEEK(711):P
   OKE 711,HLD
SP 235 REM SOME SOUND FOR EFFECT
OO 240 SOUND 0,HLD,10,2:SOUND 1,HLD+5,10,
   2:SOUND 2,HLD+10,10,2:GOTO 210
```

game of the month

3-D TIC TAC TOE

Article on page 83

LISTING 1

Don't type the TYPO II Codes!

```
JJ 10 REM 3D TIC-TAC-TOE
HC 20 REM BY PIERRE DESLOOVER
UU 30 REM (C) 1985, ANTIC PUBLISHING
PH 40 GOSUB 1520
TY 49 REM PLAY
GI 50 GRAPHICS 7:K=2:COLOR K:SQ=27:X1=67:
   WIN=0:TIE=0:LN=SAV5:LN2=SAV4:TX$=" WON
   !":FOR Z1=0 TO 27:CH(Z1)=0:NEXT Z1
JN 60 FOR Y1=10 TO 46 STEP 18:PLOT X1,Y1:
   DRAWTO X1+40,Y1:DRAWTO X1+25,Y1+15:DRA
   WTO X1-15,Y1+15:DRAWTO X1,Y1
GT 70 PLOT X1+13,Y1:DRAWTO X1-2,Y1+15:PLO
   T X1+27,Y1:DRAWTO X1+12,Y1+15:PLOT X1-
   5,Y1+5:DRAWTO X1+35,Y1+5
UB 80 PLOT X1-10,Y1+10:DRAWTO X1+30,Y1+10
   :NEXT Y1:IF CN=50 THEN GOSUB 1480:GOTO
    1140
MI 90 GOTO 110
AD 100 CN=0
ON 110 FOR T=0 TO 1
LA 120 MOVE=INT(RND(0)*9)+1:IF CH(MOVE)<>
   0 THEN 120
HT 130 CH(MOVE)=3:X1=TMB(MOVE,0):Y1=TMB(M
   OVE,1):GOSUB 200:NEXT T
PJ 140 FOR T=0 TO 2
OQ 150 MOVE=INT(RND(0)*9)+10:IF CH(MOVE)<
   >0 THEN 150
HZ 160 CH(MOVE)=3:X1=TMB(MOVE,0):Y1=TMB(M
   OVE,1):GOSUB 200:NEXT T
OZ 170 FOR T=0 TO 1
DB 180 MOVE=INT(RND(0)*9)+19:IF CH(MOVE)<
   >0 THEN 180
YO 190 CH(MOVE)=3:X1=TMB(MOVE,0):Y1=TMB(M
   OVE,1):GOSUB 200:NEXT T:GOTO 1220
RP 199 REM FILL
MM 200 X1=TMB(MOVE,0)-1:Y1=TMB(MOVE,1)-1:
   SQ=SQ-1:COLOR K:POKE 765,K:PLOT X1+12,
   Y1:DRAWTO X1+7,Y1+5:PLOT X1-5,Y1+5
IE 210 POSITION X1,Y1:XIO 18,#6,0,0,"S:":
   SOUND 0,X1,10,6:SOUND 1,Y1*2,10,6:FOR
   T1=1 TO 35:NEXT T1:SOUND 0,0,0,0
OM 220 SOUND 1,0,0,0:CLOSE #6:OPEN #6,44,
   7,"S:":X1=X1+1:Y1=Y1+1:RETURN
PC 229 REM SSI
II 230 IF S1<=9 THEN Z1=1:MAX=147:RETURN
XK 240 IF S1>=19 THEN Z1=148:MAX=294:RETU
   RN
UH 250 Z1=295:MAX=453:RETURN
YB 259 REM CONV
XI 260 S1=1
SV 270 IF TMB(S1,0)=TR(Z1,0) AND TMB(S1,1
   )=TR(Z1,1) THEN MOVE=S1:RETURN
GS 280 S1=S1+1:GOTO 270
ZI 289 REM INSP
YX 290 Z1=1
UH 300 IF Z1>MAX THEN RETURN
KZ 310 LOCATE TR(Z1,0),TR(Z1,1),R
EG 320 IF R=1 THEN Z1=Z1+1:GOTO 350
BM 330 IF R=3 THEN Z1=Z1+1:GOTO 410
GJ 340 Z1=Z1+3:GOTO 300
LH 350 LOCATE TR(Z1,0),TR(Z1,1),R
ID 360 IF R=1 THEN Z1=Z1+1:GOTO 380
GE 370 Z1=Z1+2:GOTO 300
LN 380 LOCATE TR(Z1,0),TR(Z1,1),R
QD 390 IF R=1 THEN WIN=1:RETURN
FG 400 Z1=Z1+1:GOTO 300
```

```
LA 410 LOCATE TR(Z1,0),TR(Z1,1),R
FA 420 IF R=3 THEN Z1=Z1+1:GOTO 440
FX 430 Z1=Z1+2:GOTO 300
LG 440 LOCATE TR(Z1,0),TR(Z1,1),R
RL 450 IF R=3 THEN WIN=2:RETURN
FS 460 Z1=Z1+1:GOTO 300
HT 469 REM BLK
MO 470 S1=MOVE:GOSUB 230
UY 480 IF Z1>MAX THEN RETURN
WZ 490 IF TR(Z1,0)=X1 AND TR(Z1,1)=Y1 THE
   N 510
MR 500 Z1=Z1+3:GOTO 480
GU 510 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

AO 520 IF R=0 THEN 550
EO 530 IF R=3 THEN 590
MO 540 Z1=Z1+2:GOTO 480
HC 550 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

EC 560 IF R=3 THEN 580
MJ 570 Z1=Z1+1:GOTO 480
DB 580 Z1=Z1-1:GOSUB CONV:CH(MOVE)=1:K=1:
   POP :GOSUB 200:GOTO 1220
HK 590 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

ZA 600 IF R=0 THEN 620
LY 610 Z1=Z1+1:GOTO 480
IL 620 GOSUB 260:CH(MOVE)=1:K=1:POP :GOSU
   B 200:GOTO 1220
EE 629 REM MV1
TZ 630 Z1=1:S1=1
RG 640 IF S1>MIN THEN RETURN
ZI 650 IF CH(S1)=1 THEN SAV1=TMB(S1,0):SA
   V2=TMB(S1,1):GOTO 670
HH 660 S1=S1+1:GOTO 640
IG 670 GOSUB SSI
BT 680 IF Z1>MAX THEN S1=S1+1:GOTO 640
DG 690 IF TR(Z1,0)=SAV1 AND TR(Z1,1)=SAV2
    THEN 710
OD 700 Z1=Z1+3:GOTO 680
GW 710 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

EA 720 IF R=0 THEN 780
CK 730 IF R=1 THEN 750
OA 740 Z1=Z1+2:GOTO 680
HE 750 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

PC 760 IF R=0 THEN WIN=1:GOSUB 260:CH(MOV
   E)=1:K=1:POP :GOSUB 200:GOSUB 1000
NV 770 Z1=Z1+1:GOTO 680
HK 780 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

AT 790 IF R=1 THEN 810
NI 800 Z1=Z1+1:GOTO 680
IC 810 Z1=Z1-1:WIN=1:GOSUB 260:CH(MOVE)=1
   :K=1:POP :GOSUB 200:GOSUB 1000
EP 819 REM MV2
FG 820 Z1=1:S1=1:GOTO LN
MW 830 GOTO 840+((CH(14)<>0)*10)+((CH(5)<
   >0)*10)+((CH(23)<>0)*10)
NH 840 IF CH(5)=0 THEN LN=870:CH(5)=1:MOV
   E=5:K=1:POP :GOSUB 200:GOTO 1220
LC 850 IF CH(14)=0 THEN LN=870:CH(14)=1:M
   OVE=14:K=1:POP :GOSUB 200:GOTO 1220
HA 860 IF CH(23)=0 AND CH(5)=0 THEN LN=87
   0:CH(23)=1:MOVE=23:K=1:POP :GOSUB 200:
   GOTO 1220
RO 870 IF S1>MIN THEN RETURN
QP 880 IF CH(S1)=1 THEN SAV1=TMB(S1,0):SA
   V2=TMB(S1,1):GOTO 900
LE 890 S1=S1+1:GOTO 870
SP 900 GOSUB 230
HU 910 IF Z1>MAX THEN S1=S1+1:GOTO 870
DU 920 IF TR(Z1,0)=SAV1 AND TR(S1,1)=SAV2
    THEN 940
LK 930 Z1=Z1+3:GOTO 910
HE 940 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

EY 950 IF R=0 THEN 970
LF 960 Z1=Z1+2:GOTO 910
HK 970 Z1=Z1+1:LOCATE TR(Z1,0),TR(Z1,1),R

UZ 980 IF R=0 THEN Z1=Z1-1:GOSUB 260:CH(M
   OVE)=1:K=1:POP :GOSUB 200:GOTO 1220
LA 990 Z1=Z1+1:GOTO 910
FZ 999 REM WINCK
MH 1000 IF WIN=0 AND TIE=0 THEN RETURN
IW 1010 IF WIN=1 AND MODE=1 THEN WIN$=PLY
   1$:PLY1=PLY1+1:GOTO 1060
OQ 1020 IF WIN=2 AND MODE=1 THEN WIN$=PLY
   2$:PLY2=PLY2+1:GOTO 1060
AE 1030 IF WIN=1 AND MODE=2 THEN WIN$=ACO
   MP$:PLY1=PLY1+1:GOTO 1060
PU 1040 IF WIN=2 AND MODE=2 THEN WIN$=PLY
   2$:PLY2=PLY2+1:GOTO 1060
CK 1050 TIES=TIES+1:WIN$="TIE!":TX$="
   "
IS 1060 POP :CLOSE #6:OPEN #6,56,7,"S:":G
   MS=GMS+1:? :? WIN$;TX$:GOSUB 1490+(WIN
   *10)+(TIE*10)
SK 1070 TRAP 1070:? :? "NEXT GAME(Y/N)";:
   INPUT R$
CR 1080 IF R$="Y" THEN GOTO PLAY
OO 1090 ? :? :? "MODE ";CHR$(MODE+64);"
   LEVEL ";LEV;" STATS":? :? "GMS ";GMS;"
    ";PLY1$;" ";PLY1;" ";PLY2$;" ";
PW 1100 ? PLY2;" ";"TIES ";TIES
OR 1110 TRAP 1110:? "NEW MODE/LEVEL(Y/N)"
   ;:INPUT R$:IF R$="Y" THEN OMOD=MOD:OLE
   V=LEV:GOTO 1140
IL 1120 TRAP 1120:? :? "EXIT PROGRAM(Y/N)
   ";:INPUT R$:IF R$="N" THEN 1070
WV 1130 ? :? :? "BYE!":GOSUB 1500:END
TL 1140 TRAP 1140:? :? "SELECT MODE(A/B)"
   ;:INPUT R$:IF R$<>"A" AND R$<>"B" THEN
    1140
AV 1150 MODE=ASC(R$)-64:IF MODE=1 AND MOD
   E=OMOD THEN GOTO PLAY
IF 1160 IF MODE=1 THEN PLY1$=" RED-SQR":L
   N1=1230:LEV=0:TURN$=PLY2$:GOSUB 1550:G
   OTO PLAY+CN
VZ 1170 PLY1$=ACOMP$:TRAP 1170:? :? "SELE
   CT LEVEL(1/2/3)";:INPUT LEV:IF LEV<1 O
   R LEV>3 THEN 1170
WN 1180 LEV=INT(LEV):IF MODE=OMOD AND LEV
   =OLEV THEN GOTO PLAY+CN
KR 1190 GOSUB 1550:LN1=1310:IF LEV=1 THEN
    LN=840:SAV5=LN:LN2=1400:SAV4=LN2:GOTO
    PLAY+CN
MV 1200 LN=830:SAV5=LN:IF LEV=2 THEN LN2=
   1320:SAV4=LN2:GOTO PLAY+CN
AO 1210 LN2=1340:SAV4=LN2:GOTO PLAY+CN
DS 1219 REM LOOP
HZ 1220 POP :MAX=453:CLOSE #6:OPEN #6,56,
   7,"S:":GOTO LN1
MJ 1230 IF TURN$=PLY1$ THEN TURN$=PLY2$:K
   =3:GOTO 1250
KV 1240 TURN$=PLY1$:K=1
JS 1250 TRAP 1250:? INST$:? :? TURN$;"'S
   MOVE...":INPUT MOVE:IF MOVE<0 OR MOVE>
   27 THEN 1250
TD 1255 IF MOVE=0 THEN TIES=TIES+1:GMS=GM
   S+1:GOTO 1070
EP 1260 MOVE=INT(MOVE):IF CH(MOVE)<>0 THE
   N 1250
UU 1270 CH(MOVE)=9:GOSUB 200:IF SQ>=16 TH
   EN 1300
GC 1280 GOSUB 290:GOSUB 1000
IL 1290 IF SQ=0 THEN TIE=1:GOTO 1000
OS 1300 GOTO 1220
NI 1310 GOTO LN2
OP 1320 MOVE=INT(RND(0)*27)+1:IF CH(MOVE)
   <>0 THEN 1320
AM 1330 LN2=1400:CH(MOVE)=1:K=1:GOSUB 200
   :GOTO LN2
SR 1340 MOVE=INT(RND(0)*27)+1:IF CH(MOVE)
   <>0 THEN 1340
KN 1350 IF MOVE=5 OR MOVE=14 OR MOVE=23 T
   HEN 1390
IL 1360 IF CH(5)<>0 AND CH(14)<>0 AND CH(
   23)<>0 THEN 1380
QZ 1370 GOTO 1340
AV 1380 MOVE=INT(RND(0)*27)+1:IF CH(MOVE)
   <>0 THEN 1380
NY 1390 LN2=1400:CH(MOVE)=1:K=1:GOSUB 200

MT 1400 CLOSE #6:OPEN #6,56,7,"S:":TRAP 1
   400:? INST$:? :? PLY2$;"'S MOVE...":IN
   PUT MOVE
TP 1405 IF MOVE<0 OR MOVE>27 THEN 1400
SW 1406 IF MOVE=0 THEN TIES=TIES+1:GMS=GM
   S+1:GOTO 1070
ZD 1410 MOVE=INT(MOVE):IF CH(MOVE)<>0 THE
   N 1400
ZP 1420 CH(MOVE)=2:K=3:GOSUB 200:IF SQ>=1
   6 THEN 1440
FR 1430 GOSUB 290:GOSUB 1000
SM 1440 GOSUB MV1:GOSUB 470:GOSUB MV2
ID 1450 IF SQ=0 THEN TIE=1:GOTO 1000
```

continued on next page

```
YS 1460 MOVE=INT(RND(0)*27)+1:IF CH(MOVE)
   <>0 THEN 1460
OB 1470 CH(MOVE)=1:K=1:GOSUB 200:GOSUB 29
   0:GOSUB 1000:GOTO 1220
WP 1479 REM FLASH COLORS
LG 1480 SAV3=PEEK(REG):FOR HUE=0 TO 12:FO
   R LUM=0 TO 16 STEP 2:POKE REG,HUE*16+L
   UM:NEXT LUM:NEXT HUE
EI 1490 POKE REG,SAV3:RETURN
HG 1499 REM SLIDE WHISTLE
SL 1500 SOUND 1,50,6,5:FOR T=0 TO 76:SOUN
   D 2,T,10,4:NEXT T:SOUND 1,0,0,0:SOUND
   2,0,0,0:GOSUB 1480:RETURN
WE 1510 SOUND 2,50,6,4:FOR T=76 TO 1 STEP
    -1:SOUND 1,T,10,5:NEXT T:SOUND 1,0,0,
   0:SOUND 2,0,0,0:GOSUB 1480:RETURN
TK 1519 REM GAME INITIALIZATIONS
PS 1520 GRAPHICS 18:POSITION 9,3:? #6;"3d
   ":POSITION 5,5:? #6;"tic-tac-toe"
LO 1530 REG=709:GOSUB 1560:MIN=27:CN=50:P
   OKE 702,64
IT 1540 PLAY=50:FILL=200:SSI=230:CONV=260
   :INSP=290:BLK=470:MV1=630:MV2=820:WINC
   K=1000:LOOP=1220
BV 1550 PLY1=0:PLY2=0:TIES=0:GMS=0:RETURN
CK 1560 DIM TR(454,1),TMB(27,1),CH(27),R$
   (1),WIN$(8),PLY1$(8),PLY2$(8),ACOMP$(8
   ),TURN$(8),TX$(5),INST$(37)
EQ 1570 PLY2$="BLUE-SQR":ACOMP$="COMPUTER
   ":INST$="Enter Sq.[1-27] or [0] to ter
   m. game."
JR 1580 FOR Z1=1 TO 27:READ X1,Y1:TMB(Z1,
   0)=X1:TMB(Z1,1)=Y1:NEXT Z1
DT 1590 DATA 68,11,82,11,96,11,63,16,77,1
   6,91,16,58,21,72,21,86,21,68,29,82,29,
   96,29,63,34,77,34,91,34,58,39,72,39
ST 1600 DATA 86,39,68,47,82,47,96,47,63,5
   2,77,52,91,52,58,57,72,57,86,57
UG 1610 FOR Z1=1 TO 454:READ X1,Y1:TR(Z1,
   0)=X1:TR(Z1,1)=Y1:NEXT Z1:RETURN
YL 1620 DATA 68,11,82,11,96,11,68,11,63,1
   6,58,21,68,11,77,16,86,21,68,11,68,29,
   68,47,68,11,63,34,58,57,68,11,77,34
TI 1630 DATA 86,57,68,11,82,29,96,47,82,1
   1,68,11,96,11,82,11,77,16,72,21,82,11,
   82,29,82,47,82,11,77,34,72,57,96,11
ZH 1640 DATA 82,11,68,11,96,11,91,16,86,2
   1,96,11,77,16,58,21,96,11,96,29,96,47,
   96,11,91,34,86,57,96,11,77,34,58,57
BZ 1650 DATA 96,11,82,29,68,47,63,16,68,1
   1,58,21,63,16,77,16,91,16,63,16,63,34,
   63,52,63,16,77,34,91,52,77,16,68,11
YV 1660 DATA 86,21,77,16,96,11,58,21,77,1
   6,63,16,91,16,77,16,82,11,72,21,77,16,
   77,34,77,52,91,16,96,11,86,21,91,16
RF 1670 DATA 77,16,63,16,91,16,91,34,91,5
   2,91,16,77,34,63,52,58,21,63,16,68,11,
   58,21,72,21,86,21,58,21,77,16,96,11
NQ 1680 DATA 58,21,58,39,58,57,58,21,63,3
   4,68,47,58,21,72,39,86,57,58,21,77,34,
   96,47,72,21,58,21,86,21,72,21,77,16
BE 1690 DATA 82,11,72,21,72,39,72,57,72,2
   1,77,34,82,47,86,21,91,16,96,11,86,21,
   72,21,58,21,86,21,77,16,68,11,86,21
HO 1700 DATA 86,39,86,57,86,21,91,34,96,4
   7,86,21,72,39,58,57,86,21,77,34,68,47,
   68,47,63,52,58,57,68,47,82,47,96,47
MI 1710 DATA 68,47,77,52,86,57,68,47,68,2
   9,68,11,68,47,63,34,58,21,68,47,82,29,
   96,11,68,47,77,34,86,21,82,47,68,47
PA 1720 DATA 96,47,82,47,77,52,72,57,82,4
   7,82,29,82,11,82,47,77,34,72,21,96,47,
   91,52,86,57,96,47,82,47,68,47,96,47
NZ 1730 DATA 77,52,58,57,96,47,96,29,96,1
   1,96,47,91,34,86,21,96,47,82,29,68,11,
   96,47,77,34,58,21,63,52,58,57,68,47
ZC 1740 DATA 63,52,77,52,91,52,63,52,63,3
   4,63,16,63,52,77,34,91,16,77,52,82,47,
   72,57,77,52,63,52,91,52,77,52,96,47
VQ 1750 DATA 58,57,77,52,68,47,86,57,77,5
   2,77,34,77,16,91,52,96,47,86,57,91,52,
   77,52,63,52,91,52,91,34,91,16,91,52
DS 1760 DATA 77,34,63,16,58,57,63,52,68,4
   7,58,57,72,57,86,57,58,57,77,52,96,47,
   58,57,58,39,58,21,58,57,63,34,68,11
WS 1770 DATA 58,57,72,39,86,21,58,57,77,3
   4,96,11,72,57,77,52,82,47,72,57,58,57,
   86,57,72,57,72,39,72,21,72,57,77,34
OO 1780 DATA 82,11,86,57,91,52,96,47,86,5
   7,72,57,58,57,86,57,77,52,68,47,86,57,
   86,39,86,21,86,57,91,34,96,11,86,57
UA 1790 DATA 72,39,58,21,86,57,77,34,68,1
   1,68,29,63,34,58,39,68,29,82,29,96,29,
   68,29,77,34,86,39,68,29,68,11,68,47
RJ 1800 DATA 82,29,77,34,72,39,82,29,68,2
   9,96,29,82,29,82,47,82,11,82,29,96,47,
   68,11,82,29,68,47,96,11,96,29,82,29
XL 1810 DATA 68,29,96,29,91,34,86,39,96,2
   9,77,34,58,39,96,29,96,47,96,11,63,34,
   68,29,58,39,63,34,77,34,91,34,63,34
LV 1820 DATA 63,16,63,52,63,34,68,47,58,2
   1,63,34,58,57,68,11,77,34,77,52,77,16,
   77,34,68,29,86,39,77,34,82,29,72,39
FY 1830 DATA 77,34,96,29,58,39,77,34,91,3
   4,63,34,77,34,86,39,68,29,77,34,72,39,
   82,29,77,34,58,39,96,29,77,34,63,34
FI 1840 DATA 91,34,77,34,96,47,58,21,77,3
   4,68,11,86,57,77,34,63,16,91,52,77,34,
   82,11,72,57,77,34,96,11,58,57,77,34
BR 1850 DATA 91,16,63,52,77,34,86,21,68,4
   7,77,34,72,21,82,47,91,34,96,29,86,39,
   91,34,77,34,63,34,91,34,91,52,91,16
TC 1860 DATA 91,34,96,47,86,21,91,34,86,5
   7,96,11,58,39,63,34,68,29,58,39,72,39,
   86,39,58,39,77,34,96,29,58,39,58,57
RM 1870 DATA 58,21,72,39,77,34,82,29,72,3
   9,86,39,58,39,72,39,72,57,72,21,72,39,
   86,57,58,21,72,39,58,57,86,21,86,39
CP 1880 DATA 91,34,96,29,86,39,72,39,58,3
   9,86,39,77,34,68,29,86,39,86,57,86,21,
   0,0
```

track all your program revisions automatically

VERSION SAVER

Article on page 24

LISTING 1

Don't type the TYPO II Codes!

```
GV 10 REM VERSION SAVER
XJ 20 REM BY DONALD WAHL
FW 30 REM (c) 1985, ANTIC PUBLISHING
PE 31499 STOP
LV 31500 GRAPHICS 0
VI 31510 CLR :DIM DATETIME$(14):? "INPUT
   DATE/TIME";:INPUT DATETIME$:POSITION 2
   ,2:? "31575 REM ";DATETIME$
UJ 31520 POSITION 2,2:LIST 31570:POSITION
    26,3:? "→";
TL 31530 KEYCODE=PEEK(93):IF KEYCODE<16 O
   R KEYCODE>25 THEN ? :? "BAD NAME":STOP
HG 31540 POKE 93,KEYCODE+1:IF KEYCODE=25
   THEN POKE 93,16
UW 31550 POSITION 2,4:? "CONT":POSITION 2
   ,0:POKE 842,13:STOP
DR 31560 POKE 842,12
AA 31570 SAVE "D:TESTPROG.V50"
NK 31580 STOP
OE 31590 GRAPHICS 0:POSITION 2,4:? 31499:
   FOR X=31500 TO 31600 STEP 10:? X:NEXT
   X:? 31575
JM 31600 ? "POKE 842,12":POSITION 2,0:POK
   E 842,13:STOP
```

3-D FRACTALS

Article on page 52

LISTING 1

```
/*
 * 3-D Fractal Landscapes
 * Ver. 122385/11:39
 * (c) 1985 Antic Publishing
 * Written by Patrick Bass
 *
 *-- Alcyon Include Files --------*/
#include     "osbind.h"

/*-- Definitions ------------------*/
#define      TRUE        1
#define      FALSE       0
#define      YES         1
#define      NO          2
#define      CANCEL      0
#define      LESS        1
#define      MORE        2
#define      SELECT      3
#define      HILLS       1
#define      VALLEYS     2
#define      EARTH       1
#define      WIND        2
#define      FIRE        3
#define      LOREZ       0
#define      MEDREZ      1
#define      HIREZ       2
#define      TWO_DEE     1
#define      THREE_DEE   2
#define      not         !
#define      equals      ==
#define      does_not_equal !=

/*-- Declarations, Constants -----*/

int          contrl[12], intin[128], intout[128],
                         ptsin[128], ptsout[128],
             handle, write_handle, status, finished,
             plot_color, max_color, gem_pal[16], plot[4],
             type_dimension, slope_rate,
             which_palette,

             earth_palette[] = { 0x053, 0x670, 0x460, 0x250,
                                 0x040, 0x030, 0x220, 0x320,
                                 0x230, 0x330, 0x430, 0x340,
                                 0x440, 0x450, 0x560, 0x000 },

             wind_palette[] = {  0x707, 0x607, 0x407, 0x007,
                                 0x037, 0x057, 0x075, 0x072,
                                 0x070, 0x370, 0x570, 0x770,
                                 0x750, 0x730, 0x700, 0x000 },

             fire_palette[] = {  0x343, 0x200, 0x300, 0x400,
                                 0x500, 0x600, 0x700, 0x720,
                                 0x740, 0x750, 0x760, 0x770,
                                 0x772, 0x774, 0x776, 0x000 },

             a, b, i,
             workin[]={ 1,1,1,1,1,1,1,1,1,1,2 }, workout[57],
             left_side, right_side,
```

continued on next page

```
          ch, cw, dum,
          count, count_limit, size_limit,

          xres, xp, old_xp, mx,
          yres, yp, old_yp, my,
          color_step, scale, terrain, resolution,
          color_offset[]={ 0,2,3,6,4,7,5,8,9,10,11,14,12,15,13,1 };

float     x, x_corner, x_end, gap_x, side,
          y, y_corner, y_end, gap_y, imag_range,
          x_temp, y_temp,
          x_real, y_real,
          x_constant, y_constant,
          size, temp_size, fscale, slope, slope_amount;

long      file_handle, primary_screen, secondary_screen;

char      talert[]="[2][ Type of representation? ][ 2-D | 3-D ]",
          palert[]="[2][ Which palette should I use? ][ Earth | Wind | Fire ]"
,
          alert0[]="[1][ 3-D Fractal Landscapes | (c)1985 Antic Publishing | W
ritten by Patrick Bass | V. 122385 ][ Fractalize ]",
          alert1[]="[2][ Type of terrain wanted? ][ Hills | Valleys ]",
          alert2[]="[2][ Magnification:                    ][ < | > | Select ]",

          alert2a[]="[2][ Real Corner:                   ][ < | > | Select ]",
          alert3[]="[2][ Imaginary Corner:                ][ < | > | Select ]",

          alert5[]="[2][ Want me to save this pic? ][ Yes | No ]",
          alert6[]="[2][ Want me to draw another? ][ Yes | No ]",
          alert8[]="[2][ Current scale:                  ][ < | > | Select ]",

          numbuff[ 80 ], path[]="a:\*.*", filename[ 20 ],
          alt_screen[ 32768 ];
/*---------------------------------*/
main()
{
     initialize();

     do{ draw_fractal(); }while( not finished );

     terminate();
}

/*--------------------------------*/
initialize()
{
     appl_init();
     handle=graf_handle( &ch, &cw, &dum, &dum );
     v_opnvwk( workin, &handle, workout );
     xres=workout[ 0 ];  yres=workout[ 1 ];
     max_color=workout[ 13 ];

     for( i=0; i<16; gem_pal[ i ]=Setcolor( i++, -1 ));

     resolution=Getrez();
     if( resolution equals HIREZ )
          { wind_palette[ 0 ]=0x707; wind_palette[ 15 ]=0x000; }

     clear_screen();
     form_alert( 0, alert0 );

     primary_screen=Physbase();
     secondary_screen=( 0xffff00 & alt_screen )+0x0100;
     vsm_type( handle,1 );
     finished=FALSE;
}

/*---------------------------------*/
Draw_fractal()
{
     int  button;

     finished = FALSE;
```

```
        clear_screen();
        get_ranges();
        ask_questions();

        graf_mouse( 256, 0x0L );
        for( yp=0, y=y_corner; left_side>=0; y=y+gap_y, yp++ ){

              old_yp=yp;
              old_xp=left_side;

              x=x_corner;
              slope=0;
              for( xp=left_side; xp<right_side;  xp++, x=x+gap_x ){

                    x_real=0; x_constant=x;
                    y_real=0; y_constant=y;
                    count=0; size=0;

                    while(( count< count_limit )&&( size< size_limit )){

                          x_temp=x_real*x_real-y_real*y_real;
                          y_temp=x_real*y_real*2;
                          x_real=x_temp+x_constant;
                          y_real=y_temp+y_constant;

                          size=x_real*x_real+y_real*y_real;
                          count++;
                    }
                    plot_color=count/color_step;
                    if( plot_color>15 ) plot_color=15;

                          plot_point();

                    slope=( slope+slope_amount );

                    evnt_mouse( 0, 0, 0, xres, yres, &mx, &my, &status, &dum );
                    if( status does_not_equal FALSE ){
                          left_side=(-1);
                          xp=right_side;
                    }
              }
              if( type_dimension equals THREE_DEE ){
                    left_side=( left_side-slope_rate );
                    right_side=( right_side-slope_rate );
              }
        }
        graf_mouse( 257, 0x0L );
        save_it();

        button=form_alert( 1, alert6 );
        if( button equals NO ) finished=TRUE;
}

/*--------------------------------*/
save_it()
{
        int  delay, keypress;

        for( delay=0; delay<10000; delay++ );

        keypress=form_alert( 2, alert5 );
        if( keypress equals YES ){

          Setscreen( secondary_screen, secondary_screen, -1 );

          file_handle=(-1);
          fsel_input( path, filename, &keypress );
          Setscreen( primary_screen, primary_screen, -1 );

          if( keypress does_not_equal CANCEL ){

             file_handle=Fcreate( filename, 0 );

             if( file_handle>=0 ){
```

continued on next page

```
            write_handle=file_handle;
            Fwrite( write_handle, 2L, &resolution );
            switch( which_palette ){
              case EARTH: Fwrite( write_handle, 32L, &earth_palette ); break;
              case WIND: Fwrite( write_handle, 32L, &wind_palette ); break;
              case FIRE: Fwrite( write_handle, 32L, &fire_palette );
            }
            Fwrite( write_handle, 32000L, primary_screen );
            Fclose( write_handle );
          }

      }

    }

}

/*----------------------------------*/
plot_point()
{
     int  temp_yp, bottom;

     switch( terrain ){
          case HILLS: temp_yp=yp+( (int)slope )-( scale*plot_color ); break;
          case VALLEYS: temp_yp=yp+( (int)slope )+( scale*plot_color );
     }
     bottom=yp+( (int)slope )+( scale*15 );

     vsl_color( handle, color_offset[ plot_color ]);
     plot[0]=old_xp;
     plot[1]=old_yp;
     plot[2]=xp;
     plot[3]=temp_yp;
     v_pline( handle, 2, plot );

     plot[0]=xp;
     plot[1]=temp_yp+1;
     plot[3]=bottom;
     if(( resolution equals HIREZ )||( fscale<(0.2))) vsl_color( handle, 0 );
     v_pline( handle, 2, plot );

     old_xp=xp;
     old_yp=temp_yp;
}

/*---------------------------------*/
get_ranges()
{
     int  i, button;

     side=.11;
     button=FALSE;
     while( button does_not_equal SELECT ){
          ftoa( side, numbuff, 5 );
          for( i=0; i<5; alert2[ 20+i ]=numbuff[ i++ ] );

          button=form_alert( 3, alert2 );
          if( button equals LESS ) side=( side-.002 );
          if( button equals MORE ) side=( side+.002 );
     }

     x_corner=(-1.02);
     button=FALSE;
     while( button does_not_equal SELECT ){
          ftoa( x_corner, numbuff, 5 );
          for( i=0; i<5; alert2a[ 18+i ]=numbuff[ i++ ] );

          button=form_alert( 3, alert2a );
          if( button equals LESS ) x_corner=( x_corner-.01 );
          if( button equals MORE ) x_corner=( x_corner+.01 );
     }
     x_end=x_corner+( side*2 );
     gap_x=( side /( xres-1 ) );

     y_corner=( -.31 );
```

```
      button=FALSE;
      while( button does_not_equal SELECT ){
            ftoa( y_corner, numbuff, 5 );
            for( i=0; i<5; alert3[ 23+i ]=numbuff[ i++ ] );

            button=form_alert( 3, alert3 );
            if( button equals LESS ) y_corner=( y_corner-.01 );
            if( button equals MORE ) y_corner=( y_corner+.01 );
      }
      y_end=y_corner+( side*1.5 );
      gap_y=( side*.75 )/( yres-1 );

      fscale=2.0;
      button=FALSE;
      while( button does_not_equal SELECT ){
            ftoa( fscale, numbuff, 5 );
            for( i=0; i<4; alert8[ 20+i ]=numbuff[ i++ ] );

            button=form_alert( 3, alert8 );
            if( button equals LESS ) fscale=( fscale-0.1 );
            if( button equals MORE ) fscale=( fscale+0.1 );
      }
      scale=((int)fscale);
}

/*-----------------------------------*/
ask_questions()
{
      type_dimension=THREE_DEE;
      if(resolution does_not_equal HIREZ) type_dimension=form_alert(2,talert);

      slope_rate=2; slope_amount=(.5);
      if( resolution equals HIREZ ) slope_amount=(.6);

      count_limit=100; size_limit=4;
      left_side=( xres/2 ); right_side=xres;

      if( type_dimension equals TWO_DEE ){
            slope_amount=0; slope_rate=0;
            fscale=0; scale=0;
            left_side=( xres/4 );
            right_side=( left_side*3 );
      }
      terrain=VALLEYS;
      if( type_dimension equals THREE_DEE ) terrain=form_alert( 2, alert1 );

      switch( resolution ){
            case LOREZ: filename[ 11 ]='1'; color_step=count_limit/16; break;
            case MEDREZ: filename[ 11 ]='2'; color_step=count_limit/4;  break;
            case HIREZ: filename[ 11 ]='3'; color_step=count_limit/16;
      }
      which_palette=WIND;
      if( resolution does_not_equal HIREZ) which_palette=form_alert(1, palert );

      switch( which_palette ){
            case EARTH: Setpallete( earth_palette ); break;
            case WIND: Setpallete( wind_palette ); break;
            case FIRE: Setpallete( fire_palette );
      }
}

/*--------------------------------*/
clear_screen()
{
      int  temp[4];

      vsf_interior( handle, 2 );


      vsf_style( handle, 8 );
      vsf_color( handle, 0 );
      temp[ 0 ]=0;     temp[ 1 ]=0;
      temp[ 2 ]=xres; temp[ 3 ]=yres;
```

continued on next page

```
    v_hide_c( handle );
    v_bar( handle, temp );
    v_show_c( handle );
}

/*--------------------------------*/
terminate()
{
    v_clsvwk( handle );
    Setpallete( gem_pal );
    appl_exit();
}
```

ST RESOURCE

CONTROL GEM WITH ST BASIC

Article on page 60

LISTING 1

```
1020 , VDI SHOW
1030 , V.010286
1040 , by Patrick Bass
1050 , (c) 1985, ANTIC PUBLISHING
1060 , FOR THE 520 ST ONLY!
1070 ,
1080 dim pxy(100)
1090 numpoints=0
1100 linecolor=0
1110 linewidth=2
1120 textcolor=1
1130 texteffects=2
1140 fillcolor=1
1150 fillstyle=1
1160 fillindex=1
1170 writemode=1
1180 markertype=3
1190 markercolor=5
1200 markerheight=4
1210 '
1220 '----------------------
1230 rez=peek(systab)
1240 if rez=1 then xres=639: yres=399
1250 if rez=2 then xres=639: yres=199
1260 if rez=4 then xres=319: yres=199
1270 '
1280 '----------------------
1290 '
1300 MAIN:
1310 fullw 2: clearw 2
1320 '
1330 ' Create a filled,
1331 '   rounded rectangle.
1340 fillcolor=7: gosub VSFCOLOR
1350 fillstyle=2: gosub VSFINTERIOR
1360 fillindex=5: gosub VSFINDEX
1370 pxy(0)=30: pxy(1)=30
1380 pxy(2)=100: pxy(3)=100
1390 gosub VRFBOX
1400 '
1410 ' Draw a box with thick,
1411 '    red lines.
1420 linewidth=6: gosub VSLWIDTH
1430 linecolor=2: gosub VSLCOLOR
1440 pxy(0)=xres/5
1441 pxy(1)=yres/5
1450 pxy(2)=xres-(xres/5)
1451 pxy(3)=yres/5
1460 pxy(4)=xres-(xres/7)
1461 pxy(5)=yres-(yres/5)
1470 pxy(6)=xres/7
1471 pxy(7)=yres-(yres/5)
1480 pxy(8)=xres/5
1482 pxy(9)=yres/5
1490 numpoints=5
1500 gosub VPLINE
1510 '
1520 '
1530 '
1530 for i=0 to 99
1550 ' First select a color.
1560 markercolor=rnd(9)*16
1562 gosub VSMCOLOR
1570 '
1580 ' Then select marker height.
1590 markerheight=rnd(9)*15
1592 gosub VSMHEIGHT
1600 '
1610 ' Next select a type.
1620 markertype=rnd(9)*7
1621 gosub VSMTYPE
1630 '
1640 ' Now plot the marker
1650 pxy(0)=rnd(9)*xres
1652 pxy(1)=rnd(9)*yres
1660 numpoints=1
1670 gosub VPMARKER
1680 '
1690 next i
1700 '
1710 '
1720 gotoxy 15,10
1722 writemode=2: gosub VSWRMODE
1730 texteffects=4+8
1732 gosub VSTEFFECTS
1740 textcolor=6
1742 gosub VSTCOLOR
1750 '
1760 print "Antics' VDI Demo!"
1770 '
1780 '
1782 writemode=0
1784 gosub VSWRMODE
1790 for i=0 to 5000: next i
1800 texteffects=0
1802 gosub VSTEFFECTS
1810 closew 2
1820 end
1830 '
1840 '-------------------------
```

```
1850 VPLINE:
1860 poke contrl,6
1870 poke contrl+2, numpoints
1880 for vindex=0 to numpoints*2
1890 vpoint=vindex*2
1900 poke ptsin+vpoint, pxy(vindex)
1910 next vindex
1920 vdisys(1)
1930 return
1940 '
1950 '---------------------------
1960 VSLCOLOR:
1970 poke contrl,17
1980 poke contrl+2,0
1990 poke contrl+6,1
2000 poke intin, linecolor
2010 vdisys( 1 )
2020 return
2030 '
2040 '---------------------------
2050 VSLWIDTH:
2060 poke contrl, 16
2070 poke contrl+2, 1
2080 poke contrl+6, 0
2090 poke ptsin, linewidth
2100 poke ptsin+2, 0
2110 vdisys( 1 )
2120 return
2130 '
2140 '---------------------------
2150 VSTCOLOR:
2160 poke contrl, 22
2170 poke contrl+2, 0
2180 poke contrl+6, 1
2190 poke intin, textcolor
2200 vdisys( 1 )
2210 return
2220 '
2230 '---------------------------
2240 VSTEFFECTS:
2250 poke contrl, 106
2260 poke contrl+2, 0
2270 poke contrl+6, 1
2280 poke intin, texteffects
2290 vdisys( 1 )
2300 return
2310 '
2320 '---------------------------
2330 VRFBOX:
2340 poke contrl, 11
2350 poke contrl+2, 2
2360 poke contrl+6, 0
2370 poke contrl+10, 9
2380 poke ptsin, pxy(0)
2390 poke ptsin+2, pxy(1)
2400 poke ptsin+4, pxy(2)
2410 poke ptsin+6, pxy(3)
2420 vdisys( 1 )
2430 return
2440 '
2450 '---------------------------
2460 VSFCOLOR:
2470 poke contrl, 25
2480 poke contrl+2, 0
2490 poke contrl+6, 1
2500 poke intin, fillcolor
2510 vdisys( 1 )
2520 return
2530 '
2540 '---------------------------
2550 VSFINTERIOR:
2560 poke contrl, 23
2570 poke contrl+2, 0
2580 poke contrl+6, 1
2590 poke intin, fillstyle
2600 vdisys( 1 )
2610 return
2620 '
2630 '---------------------------
2640 VSFINDEX:
2650 poke contrl, 24
2660 poke contrl+2, 0
2670 poke contrl+6, 1
2680 poke intin, fillindex
2690 vdisys( 1 )
2700 return
2710 '
2720 '---------------------------
2730 VSWRMODE:
2740 poke contrl, 32
2750 poke contrl+2, 0
2760 poke contrl+6, 1
2770 poke intin, writemode
2780 vdisys( 1 )
2790 return
2800 '
2810 '---------------------------
2820 VPMARKER:
2830 poke contrl, 7
2840 poke contrl+2, numpoints
2850 poke contrl+6, 0
2860 for vindex=0 to numpoints*2
2870 vpoint=vindex*2
2880 poke ptsin+vpoint, pxy(vindex)
2890 next vindex
2900 vdisys( 1 )
2910 return
2920 '
2930 '---------------------------
2940 VSMCOLOR:
2950 poke contrl, 20
2960 poke contrl+2, 0
2970 poke contrl+6, 1
2980 poke intin, markercolor
2990 vdisys( 1 )
3000 return
3010 '
3020 '---------------------------
3030 VSMHEIGHT:
3040 poke contrl, 19
3050 poke contrl+2, 1
3060 poke contrl+6, 0
3070 poke ptsin, 0
3080 poke ptsin+2, markerheight
3090 vdisys( 1 )
3100 return
3110 '
3120 '---------------------------
3130 VSMTYPE:
3140 poke contrl, 18
3150 poke contrl+2, 0
3160 poke contrl+6, 1
3170 poke intin, markertype
3180 vdisys( 1 )
3190 return
```

continued on next page

ST HELP! AND I/O

Be sure and look in the **Antic** HELP! section for any ST program error corrections. Also, future ST correspondence from readers will appear in **Antic's** I/O BOARD pages.

Antic's annual IRS SynCalc template

INCOME TAX SPREADSHEET

Article on page 32

Section 1 part A

```
       ---A--!---B--!---C--!---D--!---E----!

  1  1985 INCOME TAX CALCULATOR
  2  FORM
  3  LINE    CALC THIS SHEET 5 TIMES!
  4  -------
  5  1040    FILING STATUS (1= SINGLE
  6  1-5       (2= MARRIED-JOINT,
  7            (3= MARRIED-SEPARATE
  8            (4= HEAD/HOUSEHOLD,
  9            (5= WIDOW(ER).......        0
 10
 11  6f      TOTAL EXEMPTIONS =             0
 12  -------------------------------------
 13  7       WAGES                          0
 14  8       INTEREST (Sched B)            $0
 15  9a      DIVIDENDS(S.B)         $0
 16  9b-C    EXCLUSION               0     $0
 17  10      TAX REFUNDS                    0
 18  11      ALIMONY RECEIVED               0
 19  12      BUSINESS (Sch C)               0
 20  13      CAPITAL GAIN (Sch D)           0
 21  14      40% CAP GAIN                   0
 22  15      SUPPLEMENTAL GAINS             0
 23  16      FULLY TAXABLE PENSION          0
 24  17b     OTHER PENSION,TAXABLE          0
 25  18      RENTS, ETC. (Sch E)            0
 26  19      FARM (Sch F)                   0
 27  20b     UNEMPLOYMENT, TAXABLE          0
 28  21b     SOCIAL SEC., TAXABLE           0
 29  22      OTHER INCOME                   0
 30  23         TOTAL INCOME               $0
 31  24      MOVING EXP                     0
 32  25      EMPLOYEE BUS. (2106)           0
 33  26      IRA DEDUCTION                  0
 34  27      KEOGH                          0
 35  28      WITHDRAWAL PENALTY             0
 36  29      ALIMONY PAID                   0
 37  30      SCHED W COUPLE DED            $0
 38  31        TOTAL INCOME ADJ            $0
 39  32&33   *** ADJ GROSS INCOME          $0
 40  34a     ITEMZED DED. (Sch A)          $0
 41         34bCONTRIB - CASH        0
 42          34c  -    NON-CASH      0
 43         34e  - NET DEDUCTIBLE          $0
 44  35      NET INCOME                    $0
 45  36      EXEMPTION VALUE               $0
 46  37      NET TAXABLE INCOME            $0
 47  38      RATE SCHED TAX         $0
 48          SCHED G TAX            $0     $0
 49  39      ADDITIONAL TAXES               0
 50  40        *** TOTAL TAX               $0
 51  41      CARE CRED 2441         $0
 52  42/45   MISC CREDITS            0     $0
 53  46      NET TAX +- CRED               $0
 54  47/49   BUSINESS CRED                  0
 55  50      NET TAX +CRED                 $0
 56  51      SELF EMPLOY (Sch SE)           0
 57  52/55   OTHER TAXES                    0
 58  56      TOTAL TAX                     $0
 59  57      WITHHELD                0
 60  58      85 EST PAYMNTS          0
 61  59      EARNED INCOME           0
 62  60      FORM 4868               0
 63  61      EXCESS FICA             0
 64  62/63   MISC TAXES              0
 65  64        *** TOTAL PAYMENTS          $0
 66  65      OVERPAID                      $0
 67  68      OWED                          $0
```

Section 1 part B

```
D15 E190
D47 E71+E89+E105+E121
D48 E218
D51 E237
E14 E180
E16 D15-D16
E30 @SUM(E29:E13)
E37 E246
E38 @SUM(E37:E31)
E39 E30-E38
E40 E173
E43 @SUM(D41:D42)/2
E44 E39-E40
E45 1040*E11
E46 E44-E45
E48 @IF D48>0 AND D48<D47 THEN D4
8 ELSE D47
E50 E49+E48
E52 D52+D51
E53 @IF E50-E52>0 THEN E50-E52 EL
SE 0
E55 @IF E53-E54>0 THEN E53-E54 EL
SE 0
E58 E57+E56+E55
E65 @SUM(D64:D59)
E66 @IF E65>E58 THEN E65-E58 ELSE
 0
E67 @IF E58>E65 THEN E58-E65 ELSE
 0
```

Section 2 part A

```
    ---A--!---B--!---C--!---D--!---E----!
68   SCHEDULE X SINGLE
69          1       Ø       Ø
7Ø      2,39Ø       Ø   Ø.11
71      3,54Ø     127   Ø.121Ø4ØTAX          Ø
72      4,58Ø     251   Ø.14
73      6,76Ø     557   Ø.15SCHED G TAXES
74      8,85Ø     87Ø   Ø.16LINE 19          Ø
75     11,24Ø   1,252   Ø.18LINE 17          Ø
76     13,43Ø   1,647   Ø.2ØLINE 16          Ø
77     15,61Ø   2,Ø83   Ø.23LINE 8           Ø
78     18,94Ø   2,849   Ø.26LINE 1Ø          Ø
79     24,46Ø   4,284   Ø.3Ø
8Ø     29,97Ø   5,937   Ø.34
81     35,49Ø   7,814   Ø.38
82     43,19Ø  1Ø,74Ø   Ø.42
83     57,55Ø  16,771   Ø.48
84     85,13Ø  3Ø,ØØ9   Ø.5Ø
85   SCHEDULE Y MARRIED & WIDOW(ER)
86          1       Ø   Ø.ØØ
87      3,54Ø       Ø   Ø.11     FLAG        Ø
88      5,72Ø     24Ø   Ø.12
89      7,91Ø     5Ø3   Ø.141Ø4ØTAX          Ø
9Ø     12,39Ø   1,13Ø   Ø.16SCHEDULE G TAXES
91     16,65Ø   1,811   Ø.18LINE 19          Ø
92     21,Ø2Ø   2,598   Ø.22LINE 17          Ø
93     25,6ØØ   3,6Ø6   Ø.25LINE 16          Ø
94     31,12Ø   4,986   Ø.28LINE 8           Ø
95     36,63Ø   6,528   Ø.33LINE 1Ø          Ø
96     47,67Ø  1Ø,172   Ø.38
97     62,45Ø  15,788   Ø.42
98     89,Ø9Ø  26,977   Ø.45
99    113,86Ø  38,123   Ø.49
1ØØ   169,Ø2Ø  65,152   Ø.5Ø
1Ø1  SCHEDULE Y SEPARATE
1Ø2         1       Ø   Ø.ØØ
1Ø3     1,77Ø       Ø   Ø.11     FLAG        Ø
1Ø4     2,86Ø     12Ø   Ø.12
1Ø5     3,955     251   Ø.141Ø4ØTAX          Ø
1Ø6     6,195     565   Ø.16SCHEDULE G TAXES
1Ø7     8,325     9Ø6   Ø.18LINE 19          Ø
1Ø8    1Ø,51Ø   1,299   Ø.22LINE 17          Ø
1Ø9    12,8ØØ   1,8Ø3   Ø.25LINE 16          Ø
11Ø    15,56Ø   2,493   Ø.28LINE 8           Ø
111    18,315   3,264   Ø.33LINE 1Ø          Ø
112    23,835   5,Ø86   Ø.38
113    31,225   7,894   Ø.42
114    44,545  13,488   Ø.45
115    56,93Ø  19,Ø62   Ø.49
116    84,51Ø  32,576   Ø.5Ø
117  SCHEDULE Z HEAD OF HOUSEHOLD
118         1       Ø   Ø.ØØ
119     2,39Ø       Ø   Ø.11     FLAG        Ø
12Ø     4,58Ø     241   Ø.12
121     6,76Ø     5Ø3   Ø.141Ø4ØTAX          Ø
122     9,Ø5Ø     823   Ø.17SCHEDULE G TAXES
123    12,28Ø   1,372   Ø.18LINE 19          Ø
124    15,61Ø   1,972   Ø.2ØLINE 17          Ø
125    18,94Ø   2,638   Ø.24LINE 16          Ø
126    24,46Ø   3,962   Ø.28LINE 8           Ø
127    29,97Ø   5,5Ø5   Ø.32LINE 1Ø          Ø
128    35,49Ø   7,272   Ø.35
129    46,52Ø  11,132   Ø.42
13Ø    63,Ø7Ø  18,Ø83   Ø.45
131    85,13Ø  28,Ø1Ø   Ø.48
132   112,72Ø  41,253   Ø.5Ø
```

Section 2 part B

```
E71 @IF [E9]=1 AND [E46]>23ØØ THE
N @LOOKUP([E46],A69:A84,1)+@LOOKU
P([E46],A69:A84,2)*([E46]-@LOOKUP
([E46],A69:A84,Ø)) ELSE Ø
E74 @IF [E9]=1 AND [E21Ø]>23ØØ TH
EN @LOOKUP([E21Ø],A69:A84,1)+@LOO
KUP([E21Ø],A69:A84,2)*([E21Ø]-@LO
OKUP([E21Ø],A69:A84,Ø)) ELSE Ø
E75 @IF [E9]=1 AND [E2Ø8]>23ØØ TH
EN @LOOKUP([E2Ø8],A7Ø:A84,1)+@LOO
KUP([E2Ø8],A7Ø:A84,2)*([E2Ø8]-@LO
OKUP([E2Ø8],A7Ø:A84,Ø)) ELSE Ø
E76 @IF [E9]=1 AND [E2Ø7]>23ØØ TH
EN @LOOKUP([E2Ø7],A69:A84,1)+@LOO
KUP([E2Ø7],A69:A84,2)*([E2Ø7]-@LO
OKUP([E2Ø7],A69:A84,Ø)) ELSE Ø
E77 @IF [E9]=1 AND [E199]>23ØØ TH
EN @LOOKUP([E199],A69:A84,1)+@LOO
KUP([E199],A69:A84,2)*([E199]-@LO
OKUP([E199],A69:A84,Ø)) ELSE Ø
E78 @IF [E9]=1 AND [E2Ø1]>23ØØ TH
EN @LOOKUP([E2Ø1],A69:A84,1)+@LOO
KUP([E2Ø1],A69:A84,2)*([E2Ø1]-@LO
OKUP([E2Ø1],A69:A84,Ø)) ELSE Ø
E87 @IF [E9]=2 OR E9=5 THEN 1 ELS
E Ø
E89 (@LOOKUP([E46],A86:A1ØØ,1)+@L
OOKUP([E46],A86:A1ØØ,2)*([E46]-@L
OOKUP([E46],A86:A1ØØ,Ø)))*E87
E91 (@LOOKUP([E21Ø],A86:A1ØØ,1)+@
LOOKUP([E21Ø],A86:A1ØØ,2)*([E21Ø]
-@LOOKUP([E21Ø],A87:A1ØØ,Ø)))*E87
E92 (@LOOKUP([E2Ø8],A86:A1ØØ,1)+@
LOOKUP([E2Ø8],A86:A1ØØ,2)*([E2Ø8]
-@LOOKUP([E2Ø8],A87:A1ØØ,Ø)))*E87
E93 (@LOOKUP([E2Ø7],A86:A1ØØ,1)+@
LOOKUP([E2Ø7],A86:A1ØØ,2)*([E2Ø7]
-@LOOKUP([E2Ø7],A87:A1ØØ,Ø)))*E87
E94 (@LOOKUP([E199],A86:A1ØØ,1)+@
LOOKUP([E199],A86:A1ØØ,2)*([E199]
-@LOOKUP([E199],A87:A1ØØ,Ø)))*E87
E95 (@LOOKUP([E2Ø1],A86:A1ØØ,1)+@
LOOKUP([E2Ø1],A86:A1ØØ,2)*([E2Ø1]
-@LOOKUP([E2Ø1],A87:A1ØØ,Ø)))*E87
E1Ø3 @IF [E9]=3 THEN 1 ELSE Ø
E1Ø5 (@LOOKUP([E46],A1Ø2:A116,1)+
@LOOKUP([E46],A1Ø2:A116,2)*([E46]
-@LOOKUP([E46],A1Ø2:A116,Ø)))*E1Ø
3
E1Ø7 (@LOOKUP([E21Ø],A1Ø2:A116,1)
+@LOOKUP([E21Ø],A1Ø2:A116,2)*([E2
1Ø]-@LOOKUP([E21Ø],A1Ø3:A116,Ø)))
*E1Ø3
E1Ø8 (@LOOKUP([E2Ø8],A1Ø2:A116,1)
+@LOOKUP([E2Ø8],A1Ø2:A116,2)*([E2
Ø8]-@LOOKUP([E2Ø8],A1Ø3:A116,Ø)))
*E1Ø3
E1Ø9 (@LOOKUP([E2Ø7],A1Ø2:A116,1)
+@LOOKUP([E2Ø7],A1Ø2:A116,2)*([E2
Ø7]-@LOOKUP([E2Ø7],A1Ø3:A116,Ø)))
*E1Ø3
```

continued on next page

```
E110 (@LOOKUP([E199],A102:A116,1)
+@LOOKUP([E199],A102:A116,2)*([E1
99]-@LOOKUP([E199],A103:A116,0)))
*E103
E111 (@LOOKUP([E201],A102:A116,1)
+@LOOKUP([E201],A102:A116,2)*([E2
01]-@LOOKUP([E201],A103:A116,0)))
*E103
E119 @IF [E9]=4 THEN 1 ELSE 0
E121 (@LOOKUP([E46],A118:A132,1)+
@LOOKUP([E46],A118:A132,2)*([E46]
-@LOOKUP([E46],A118:A132,0)))*E11
9
E123 (@LOOKUP([E210],A118:A132,1)
+@LOOKUP([E210],A118:A132,2)*([E2
10]-@LOOKUP([E210],A119:A132,0)))
*E119
E124 (@LOOKUP([E208],A118:A132,1)
+@LOOKUP([E208],A118:A132,2)*([E2
08]-@LOOKUP([E208],A119:A132,0)))
*E119
E125 (@LOOKUP([E207],A118:A132,1)
+@LOOKUP([E207],A118:A132,2)*([E2
07]-@LOOKUP([E207],A119:A132,0)))
*E119
E126 (@LOOKUP([E199],A118:A132,1)
+@LOOKUP([E199],A118:A132,2)*([E1
99]-@LOOKUP([E199],A119:A132,0)))
*E119
E127 (@LOOKUP([E201],A118:A132,1)
+@LOOKUP([E201],A118:A132,2)*([E2
01]-@LOOKUP([E201],A119:A132,0)))
*E119
```

Section 3 part A

```
     ---A--|---B--|---C--|---D--|---E----|
133  SCHEDULE A
134    MEDICAL
135  1       PRESCRIPTIONS                0
136  2a      DR,DDS,ETC.                  0
137  2b      TRANSPORTATION               0
138  2c      OTHER                        0
139  2c                                   0
140  2c                                   0
141  3            TOTAL                  $0
142  4       LESS 5%                     $0
143  5          DEDUCTION                $0
144    TAXES
145  6       INCOME                       0
146  7       REAL ESTATE                  0
147  8a/b    SALES                        0
148  9       OTHER                        0
149  10         DEDUCTION                $0
150    INTEREST
151  11a     INT. FINANCIAL               0
152  11b     INT. OTHER                   0
153  12      CREDIT CARDS                 0
154  13      OTHER                        0
155  13                                   0
156  14         DEDUCTION                $0
157    CONTRIBUTIONS
158  15a     CASH SMALL                   0
159  15b     CASH LARGE                   0
160  16      NON-CASH                     0
161  17      CARRYOVER                    0
162  18         DEDUCTION                $0
163  19 CASULTY LOSS                      0
164    MISC
165  20      DUES                         0
166  21      TAX PREP                     0
167  22      OTHER                        0
168  22                                   0
169  23         DEDUCTION                $0
170    TOTALS
171  24      SUM ABOVE                   $0
172  25      STATUS DEDUCTION            $0
173  26    TOTAL DED 1040 LINE 34a       $0
```

Section 3 part B

```
E141 @SUM(E140:E135)
E142 E39*0.05
E143 @IF E141-E142>0 THEN E141-E1
42 ELSE 0
E149 @SUM(E148:E145)
E156 @SUM(E155:E151)
E162 @SUM(E161:E158)
E169 @SUM(E168:E165)
E171 E169+E163+E162+E156+E149+E14
3
E172 @IF E9=2 OR E9=5 THEN 3540 E
LSE  @IF E9=1 OR E9=4 THEN 2390 E
LSE  @IF E9=3 THEN 1770 ELSE 0
E173 @IF E171-E172>0 THEN E171-E1
72 ELSE 0
```

Section 4 part A

```
     ---A--|---B--|---C--|---D--|---E----|
174  SCHEDULE B
175    INTEREST PART I
176  1       SELLER-FINANCED              0
177  2       OTHER INTEREST               0
178  2                                    0
179  2                                    0
180  3         TOTAL INT, 1040 LN 8      $0
181  DIVIDENDS PART II
182  4       PAYOR                        0
183  4                                    0
184  4                                    0
185  5         TOTAL                     $0
186  6       GAIN DISTRIB        0
187  7       NONTAXABLE          0
188  8       UTILITY EXCL        0
189  9        SUB TOTL EXCLUDABLE        $0
190  10      NET TO 1040, LINE 9         $0
```

Section 4 part B

```
E180 @SUM(E179:E176)
E185 E184+E183+E182
E189 @SUM(D188:D186)
E190 E185-E189
```

Section 5 part A

```
    ---A--¦---B--¦---C--¦---D--¦---E----¦
191  SCHEDULE G INCOME AVERAGING
192  1 '82 1Ø4Ø L 37                           Ø
193  4 '83 1Ø4Ø L 37                           Ø
194  3 '84 1Ø4Ø L 37                           Ø
195  4 OUTSIDE US INCOME 82-84                 Ø
196  5      TOTAL INCOME                      $Ø
197  6  DIVIDE BY 3                           $Ø
198  7  MULTIPLY BY 1.4                       $Ø
199  8  85 INCOME 1Ø4Ø L37                    $Ø
2ØØ  9  PREMATURE DISTRIBUTION                 Ø
2Ø1  1Ø  NET OF DISTRIBUTION                  $Ø
2Ø2  11  COMMUNITY STATE                       Ø
2Ø3  12  NET OF LINES 11 & 1Ø                 $Ø
2Ø4  13  1.4 FROM LINE 7                      $Ø
2Ø5  14  AVERAGABLE INCOME                    $Ø
2Ø6  15  25% OF AVERAGABLE INCOME             $Ø
2Ø7  16  AMOUNT ON LINE 7                     $Ø
2Ø8  17  TOTAL OF LINES 15 & 16               $Ø
2Ø9  18  AMOUNT ON LINE 11                    $Ø
21Ø  19  TOTAL OF LINES 17 & 18               $Ø
211  2Ø  TAX ON LINE 19                       $Ø
212  21  TAX ON LINE 17             $Ø
213  22  TAX ON LINE 16             $Ø
214  23  NET LINES 21 & 22          $Ø
215  24  3ØØ% OF LINE 23                      $Ø
216  25  TAX ON LINE 8              $Ø
217  26&27 TAX ON LINE 1Ø           $Ø        $Ø
218  28  SCH G TAX TO 1Ø4Ø,LN 38              $Ø
```

Section 5 part B

```
D212 E75+E92+E1Ø8+E124
D213 E76+E93+E1Ø9+E125
D214 D212-D213
D216 E77+E94+E11Ø+E126
D217 E78+E95+E111+E127
E196 @SUM(E192:E195)
E197 E196/3
E198 E197*1.4
E199 E46
E2Ø1 E199-E2ØØ
E2Ø3 @IF E2Ø1-E2Ø2>Ø THEN E2Ø1-E2
Ø2 ELSE Ø
E2Ø4 E198
E2Ø5 @IF E2Ø4>Ø THEN E2Ø3-E2Ø4 EL
SE Ø
E2Ø6 Ø.25*E2Ø5
E2Ø7 E198
E2Ø8 E2Ø7+E2Ø6
E2Ø9 E2Ø2
E21Ø E2Ø9+E2Ø8
E211 E74+E91+E1Ø7+E123
E215 3*D214
E217 @IF E2ØØ>Ø THEN D216-D217 EL
SE Ø
E218 @IF E2Ø5<3ØØ1 THEN Ø ELSE E2
17+E215+E211
```

Section 6 part A

```
    ---A--¦---B--¦---C--¦---D--¦---E----¦
219  CHILD CARE CREDIT SCHED 2441
22Ø  3  EXPENSES PAID                          Ø
221  4a OWN EARNED INCOME          Ø
222  4b SPOUSE'S E. INCOME         Ø          $Ø
223  5  EXPENSE BASE                          $Ø
224  PERCENT        Ø    Ø.3Ø
225    TABLE 1Ø,ØØØ    Ø.29
226          12,ØØØ    Ø.28
227          14,ØØØ    Ø.27
228          16,ØØØ    Ø.26
229          18,ØØØ    Ø.25
23Ø          2Ø,ØØØ    Ø.24 LINE 6
231          22,ØØØ    Ø.23DEDUCTIBLE
232          24,ØØØ    Ø.22PERCENT       Ø.3Ø
233          26,ØØØ    Ø.21
234          28,ØØØ    Ø.2Ø
235  7  1984 PERCENTAGE AMOUNT                $Ø
236  8  84 EXP PAID IN 85 @ 84'S%              Ø
237  9  TOTAL CREDIT 1Ø4Ø,LN 41               $Ø
```

Section 6 part B

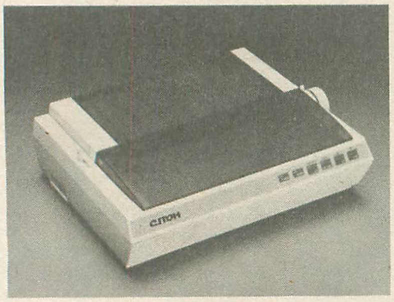
```
E222 @IF D221<D222 AND D222>Ø THE
N D221 ELSE  @IF D222=Ø THEN D221
 ELSE D222
E223 @IF E22Ø<E222 THEN E22Ø ELSE
 E222
E232 @LOOKUP(E39,B224:B234,1)
E235 E223*E232
E237 E236+E235
```

Section 7 part A

```
    ---A--¦---B--¦---C--¦---D--¦---E----¦
238  SCHEDULE W - MARRIED COUPLES
239                              YOU    SPOUSE
24Ø  1 WAGES, ETC 1Ø4Ø, L7         Ø        Ø
241  2 PROFIT, SCH C,F,K           Ø        Ø
242  3 TOT EARNED INCOME          $Ø       $Ø
243  4 ADJ 1Ø4Ø,L26-27,31          Ø        Ø
244  5 NET QUALIFD INCOME         $Ø       $Ø
245  6 SMALLER FROM LINE 5                 $Ø
246  8 DEDUCTION 1Ø4Ø L 3Ø                 $Ø
```

Section 7 part B

```
D242 +D241+D24Ø
D244 D242-D243
E242 +E241+E24Ø
E244 E242-E243
E245 @IF D244<Ø OR E244<Ø THEN Ø
ELSE  @IF D244<=E244 THEN D244 EL
SE E244
E246 @IF E245>3ØØØØ THEN 3ØØØ ELS
E Ø.1*E245
```



CHROMA PRO MONITORS, C-310 PRINTER

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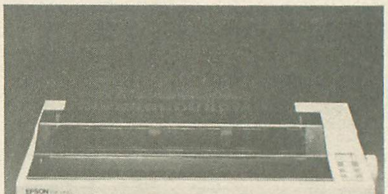
(mouse and software)
Zobian Controls
P.O. Box 6406
Wyomissing, PA 19610
$99.95, 48K disk

The **Rat**, a high-resolution mouse system for all 8-bit Atari computers, comes with the Accu-Draw icon-driven graphics program; Control, a mouse cursor control program; and BASIC subroutines showing you how to use the Rat in your own programs.

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(screen filter)
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Novato, CA 94947
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(educational software)
Gradescan
1722 Golden Court
Crofton, MD 21114
$29.95, 48K disk

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(online service)
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Columbus, OH 43220
(800) 848-8199
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(online service)
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3215 N. Frontage Road, Suite 1505
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COMPUTEREYES GRAPHICS 9

(software)
Digital Vision
14 Oak Street, Suite 2
Needham, MA 02192
(617) 444-9040
$15, 48K disk

Computereyes Graphics 9 software is a new higher-resolution enhancement for the Computereyes Video Digitizer (sold separately) to create images of superior, almost photographic, clarity in 16 separate shades of gray. Images can be digitized from any video source. See **Antic**, December 1985 for a review of Computereyes.

TINY TOTS, LITTLE FOLKS, SMALL FRY, SPANISH PRETERIT

(educational software)
Athena Software
1001 Hysell Court
Turlock, CA 95380
$12 each, 32K disk

This software series was originally created by a teacher for her grandchildren. **Tiny Tots** is a collection of eight programs to help preschoolers learn letters and numbers. **Little Folks** teaches kindergarten-level spelling and math, **Small Fry** introduces multiplication and word games for second and third grade. **Spanish Preterit** is suitable for classroom Spanish drills.

R-TIME 8

(hardware)
ICD, Inc.
1220 Rock Street, Suite 310
Rockford, IL 61101-1437
(815) 229-2999
$69.95, cartridge

R-Time 8 provides automatic time and date stamping on files running under ICD SpartaDOS on any 8-bit Atari. It also provides continuous time/date display accessible from BASIC and other computer languages, Bulletin Boards, terminal programs and home control systems. Has its own expansion port, so no cartridge access is lost.

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(software)
Synthetic Software
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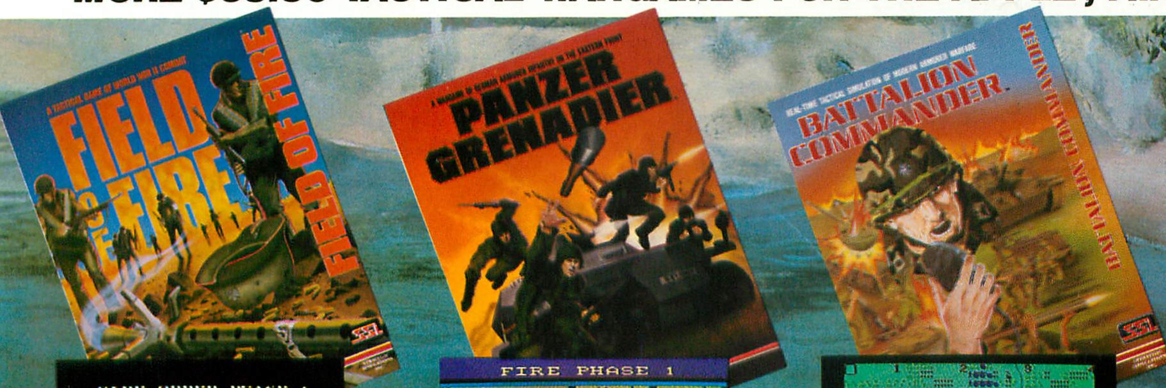
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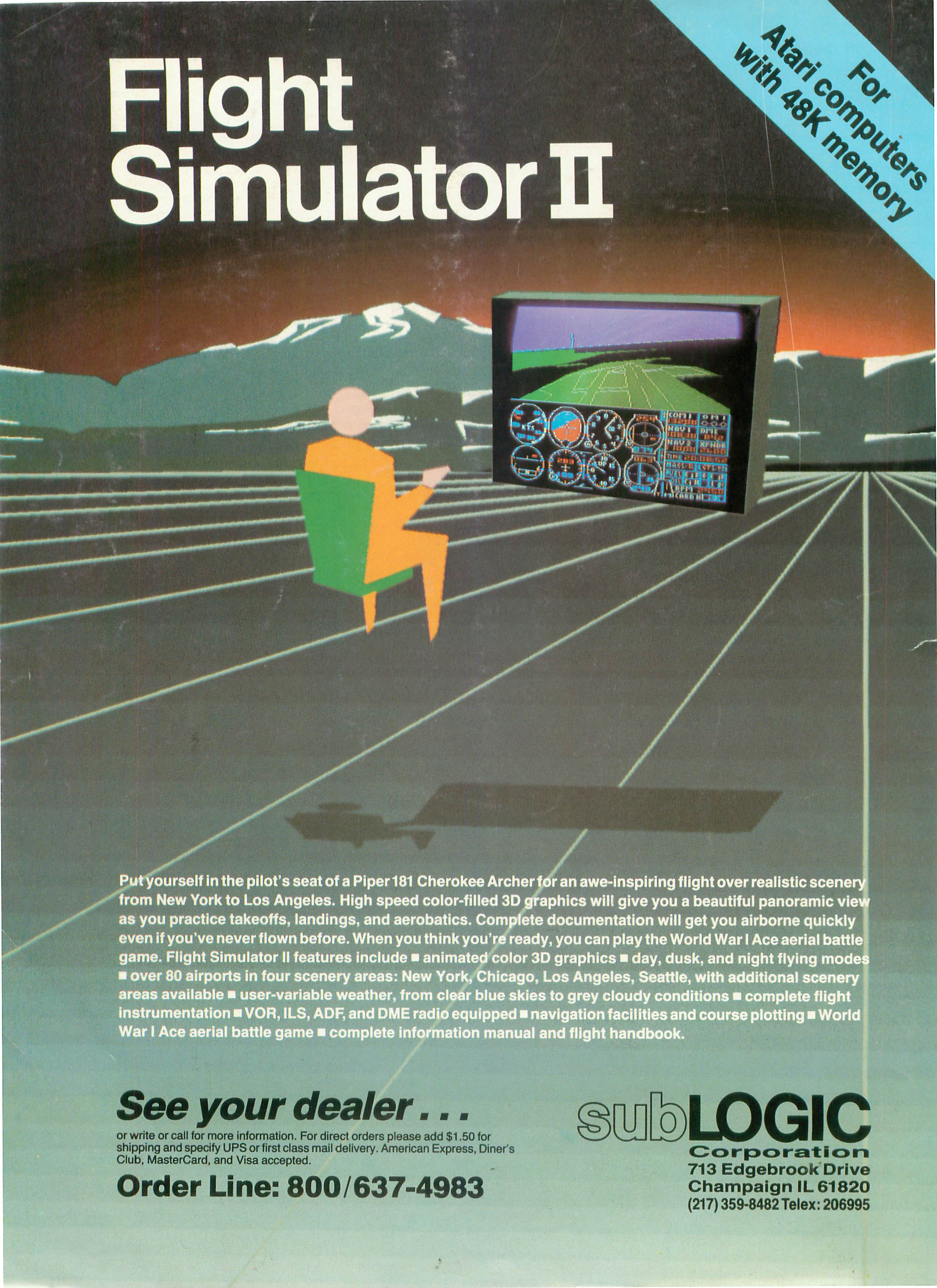




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